



RFP Document

No. GIPCL/ Solar/EPC/2022/75 MW (AC) Solar

21st Jan, 2022

BID FOR DESIGN, ENGINEERING, SUPPLY & PROCUREMENT, CONSTRUCTION, ERECTION, TESTING, COMMISSIONING, OPERATION AND MAINTENANCE OF SOLAR PHOTOVOLTAIC GRID-CONNECTED POWER PLANT OF 75MW (AC) NEAR SURAT LIGNITE POWER PLANT OF GIPCL, DIST. SURAT, GUJARAT



Issued by

**Gujarat Industries Power Company Limited
(GIPCL)**

GIPCL CORPORATE OFFICE, PO: RANOLI-391 350

DIST.: VADODARA, GUJARAT

Ph. No: +91-265 – 2230185 / 2232768 / 2213

FAX No: +91-265-2230029

Website: www.gipcl.com

Email: solar@gipcl.com; snpurohit@gipcl.com;



Gujarat Industries Power Company Limited (GIPCL)

(Regd. Office: PO: Ranoli-391350, Dist: Vadodara, Gujarat)

Website: - www.gipcl.com



Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) Near Surat Lignite Power Plant of GIPCL, Dist. Surat, Gujarat

ISSUED BY:

**CHIEF GENERAL MANAGER (RE & BO)
GUJARAT INDUSTRIES POWER COMPANY LIMITED (GIPCL)**

ON

21st Jan, 2022

SECTION-1: NOTICE INVITING TENDER (NIT)



GUJARAT INDUSTRIES POWER COMPANY LIMITED

P.O Ranoli,

Dist.: Vadodara-391350, Gujarat, India.

Tel.: +91-265-2230185/ +91-265-22332768/2213

Fax: +91-265-2230029

Cell: +91-9909035311

E-mail: solar@gipcl.com, snpurohit@gipcl.com

SECTION-1

NOTICE INVITING TENDER (NIT)

“Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plants of 75MW (AC) Near Surat Lignite Power Plant of GIPCL, Dist: Surat, Gujarat”.

Gujarat Industries Power Company Limited (GIPCL) invites interested parties to participate in this Request for Proposal (this **“RFP or the “Tender Documents” or the “Tender”**) for bidding and selection process for the appointment of Contractor for Design, Engineering, Supply & Procurement, Construction, Erection , Testing , Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plants of 75MW (AC) Near Surat Lignit Power Plant of GIPCL, Dist. Surat, Gujarat (the **“Projects”**).



Gujarat Industries Power Company Limited has decided to appoint an EPC Contractor for development of 75 MW (AC capacity) Solar Plant competitive bidding process. Considering the large volume and quantum of work involved, GIPCL may award the work to more than one Bidder to facilitate timely supply and completion of the Project. Further, GIPCL reserves the right to award the work to single bidder or multiple bidders, without assigning any reason.

Tender Documents may be downloaded from Web site <https://www.nprocure.com> or <https://gipcl.nprocure.com> (For view, down load and on-line submission) and GIPCL website <http://www.gipcl.com> (For view & download only.) Tender fee & EMD shall be paid along with submission of Tender Documents. All the relevant documents of Tender shall be submitted physically by **Registered Post A.D. or Speed Post or by Hand Delivery** addressed to: **Shri S. N. Purohit, CHIEF GENERAL MANAGER (RE & BO), Gujarat Industries Power Company Limited, PO:Ranoli-391 350, Dist.: Vadodara, Gujarat**, superscribing the envelope with Tender No. and Description. “NO COURIER SERVICE” shall be considered for submission of Tender.

TABLE A: IMPORTANT DATES

| Sr. | Event | Date (and Time) |
|------|--|--|
| i. | Date of upload of original tender (Document No. GIPCL/ Solar/EPC/2022/75 MW (AC) Solar PV/1.1) | : 21 st January 2022 |
| ii. | Last date and time for receipt of questions/ queries/ clarifications | : 27 th Jan-2022 |
| iii. | Date and Time of Site visit & Pre-bid Meeting /Briefing Meeting | : Site Visit: 27 th Jan -2022 at Suvarat Lignite Power Plant, Dist: Surat, Gujarat Pre-Bid meeting: 28 th January 2022 at 11:30 Hrs online through Video Conference |
| iv. | Online (e-tendering) Tender/Offer submission last date {This is mandatory} | : 11 th Feb, 2022 Time: 17:00 hours (IST) On N-Procure portal for Bid Submission |
| v. | Physical receipt of Bid with all the relevant documents last date (By RPAD or Speed Post or By Personal Messenger) {This is mandatory} | : 11 th Feb 2022 Time: 15:00 hours (IST) Venue: GIPCL Corporate Office, PO: Ranoli - 391 350, Dist. Vadodara. |
| vi. | Bid Validity | : Offers shall be valid for a period of One Hundred and Twenty (120) days from bid submission due date. |
| vii. | Date of opening of Tender Fee, EMD Cover, Vendor Registration and Technical Bid Physical as well as Online opening | : 11 th Feb 2022 (Internal opening by GIPCL) |

| | |
|--|--|
| <p>viii. a) Opening of Financial Bid</p> <p>b) e-Reverse Auction starts from</p> | <p>:</p> <p>a) Will be decided by GIPCL and will be intimated to Qualified Bidders.</p> <p>b) Will be informed by GIPCL to all qualified Bidders.</p> |
| <p>ix. Target date for Commissioning of Project</p> | <p>: 485 days from date of Letter of Intent (LoI)</p> |
| <p>x. Tentative Date for completion of Operational Acceptance Test</p> | <p>: 515 days from date of Letter of Intent (LoI)</p> |
| <p>xi. Performance Guarantee (PG) Test Period &. start of O&M Period</p> | <p>: Performance Guarantee (PG) Test Period shall start as under:</p> <p>A) If the Contractor successfully completes Operational Acceptance Test (OAT) in first attempt within 30 days from date of commissioning then PG Test Period and O&M Period will start from the date when the OAT was started. (OR)</p> <p>B) In case the Contractor fails the OAT in the first attempt, the Contractor shall be allowed maximum 30 days for corrective actions and further next OAT shall start on completion of 30days period or earlier as desired by the Contractor. The PG Test and the O&M period shall start from the date when of second OAT period is started. In case the Contractor fails in the second attempt as well, a penalty will be imposed at 1% of EPC Contract</p> |

Price. In this case, irrespective of the result (whether pass or fail) of the OAT, the PG Test and O&M Period shall start at the beginning of the second OAT. The start of O&M and first year operation shall be considered after successful completion of operational acceptance test or 60 days from date of commissioning of 75MW (AC) Solar Project whichever is earlier. Further all the guarantees related to NEEGG / Incentive shall also be applicable. (OR)

C) However, in case of failure of the second OAT, if the Contractor needs more time to further take corrective action at its own discretion, then the same may be allowed by GIPCL without imposing any further penalty on the Contractor towards such subsequent OATs. However, if the Contractor is successful in third attempt then the penalty deducted at the time of unsuccessful 2nd attempt of OAT shall be returned but if the Contractor fails in third attempt of OAT then penalty charged at the time of second unsuccessful attempt of OAT shall not be returned to the Contractor.

D) In any case the start of O&M period and first year operation shall be considered after successful completion

| | | |
|-------|---|---|
| | | <u>of operational acceptance test or 60 days from date of commissioning of 75MW (AC) Solar Project whichever is earlier. Further all the guarantees related to NEEGG / Incentive shall also be applicable</u> |
| xii. | Operation and Maintenance (O&M) Period | : Upon start of PG Test Period as per Clause No. xi above for a period of three (3) years. |
| xiii. | EMD Validity | : One Hundred and Twenty (120) days from bid submission due date |
| xiv. | Bank Guarantee Against PV Module Waranty (if applicable) as per Clause no. 6.39.10. | 90 days beyond the 25 Years from the date of Commissioning of the entire Project. |
| xv. | | Void |
| xvi. | Queries regarding Pre- Bid meeting | Any queries regarding pre-bid meeting may be forwarded to Contact Person of GIPCL at least three days prior to the Pre-Bid meeting. |

Note: The abovementioned dates are subject to amendment, in which case the amendments shall be publically intimated.

TABLE B: IMPORTANT AMOUNTS

| Sr. | Head | Amount (and Validity) |
|------|--|---|
| i. | Tender Fees (non-refundable) | : Rs. 25,000/- + 18 % GST i.e. 29,500/- (Rupees Twenty- Nine Thousand Five Hundred Only) |
| ii. | Earnest Money Deposit (EMD) in the form of Bank Guarantee (Refundable/adjustable) | : Rs. 3.00 Cr (With a validity as per Clause No. xiii of Table A (Important Dates) above. |
| iii. | Security Deposit cum Performance Bank Guarantee (PBG) | : The Contractor shall furnish Security Deposit (SD) cum Performance Bank Guarantee (PBG) equivalent to 10% (ten percent) of the EPC Cost within two weeks after issuance of LOI. The validity period of PBG should be for a total period up to 31 months from the date of LoI or till the date of successful completion of PG test whichever is later; if required, the PBG shall have to be extended for further 3 months beyond the due date of successful completion of PG test. |
| iv. | O&M Bank Guarantee (O&M BG) | : 5% of EPC Contract Price, to be submitted upon completion and acceptance of Performance Guarantee Test as per Clause No. xi of Table A (Important Dates) above for a period of three (3) years, to the 90 days beyond completion of the O&M Period mentioned in Clause No. xii of Table A (Important Dates) above. This O&M BG shall cover the risk against extended warrantee for equipment up to O&M Period and recovery towards shortfall in NEEGG during O&M Period. The O&M Bank Guarantee shall be valid 90 days beyond the O&M Period. |

| | |
|---|---|
| <p>Insurance or Performance Bank</p> <p>v. Guarantee (PBG) Against PV Module Warranty</p> | <p>Rs. 25 Lacs per MW of PV Module (DC Capacity) valid for 25 years required to be submitted prior to submission of SD/PBG.</p> |
| <p>Performance Guarantee Test</p> <p>vi. Run & Bank Guarantee during PG Test for under Generation</p> | <p>Rs. 23.69 per kWh</p> |

IMPORTANT NOTE TO BIDDERS:

Timely submission of offer to GIPCL: In addition to bid submitted online, all the relevant documents as per requirement of the Tender shall also be submitted physically along with the proof of Tender Fee and EMD in sealed cover so that the same is received in this office on or before the due date and time. All such documents should be strictly submitted by **RPAD / speed post/ in person in sealed cover** only. Otherwise the offer will not be considered and no any further communication in the matter will be entertained. **Please note that Price Bid is not to be submitted in physical form.**

No Tender shall be accepted in any case after due date and time of receipt of the Tender, irrespective of delay due to postal services or any other reasons and GIPCL does not assume any responsibility for late receipt of the Tender.

1. All interested parties are requested to understand this Tender in detail in order to comply with GIPCL's requirements including but not limited to the fees and deadlines, selection criteria, selection methodology, scope of work, and minimum technical standards. They shall strictly abide by ALL terms prescribed in this Tender and provide accurate information to the best of their knowledge without misleading the Owner to be considered for participation in this Project.
2. It is **mandatory** for all the Bidders to submit their Financial Bid ONLINE only via e-tendering portal.
3. **Technical Bid (Techno-commercial Bid)** to be submitted both in physical as well as soft copy (online). It is **mandatory** for all the bidders to submit their Technical Bid (Techno-commercial Bid) documents in both forms i.e. online (e-tendering) as well as in hard copy in scheduled time. Technical bid in any one form i.e. either in soft copy (online) or in hard copy (physical form), shall not be considered. Technical Bid (Techno-commercial Bid) in THREE (3) copies (1 Original+ 2 Copies) shall be sent in Sealed Envelopes containing copies of Technical bid (Techno-commercial bid).

Technical Bid (Techno-commercial Bid) envelope shall be superscribed as: **“GIPCL/ Solar/EPC/2022/75 MW (AC) Solar ; Technical Bid for Design, Engineering, Supply & Procurement, Construction, Erection , Testing , Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) Near Surat Lignite Power Plant of GIPCL, Dist: Surat, Gujarat”.**



4. All the envelopes shall be addressed to: Shri S.N. Purohit, CHIEF GENERAL MANAGER (RE & BO), Gujarat Industries Power Company Limited, PO: Ranoli-391350, Dist.: Vadodara, Gujarat. Complete postal address of the Bidder shall appear on all the envelopes so that it is possible to find out whose Bid it is without opening the envelope.
5. Tender Fee and EMD shall be submitted in two separate envelopes.
6. Tender fee (non-refundable) will be accepted by DD drawn in favour of the Gujarat Industries Power Company Limited payable at Vadodara. Tenders submitted without Tender Fee shall not be accepted. The envelope for Tender Fee should be superscribed as “Tender Fee”. Cheques are not acceptable.
7. Bidder(s) have to pay total EMD of as per Clause No. ii of Table B (Important Amounts) above. EMD shall be in the form of Bank Guarantee in favour of “Gujarat Industries Power Company Limited” payable at Vadodara. The envelope for EMD should be superscribed as “EMD”. Cheques are not acceptable.
8. It is mandatory for all Bidders to submit their Price Bid (Appendix 15) only through on-line (e-tendering) mode. Price Bids submitted in physical form shall not be considered for its opening and only on-line submitted price bid will be considered for evaluation. Bidders to note that Price Bid (Appendix 15) of only those Bidders shall be opened (On-line-tendering) who are found technically qualified and are found reasonably responsive to GIPCL’s Tender terms and conditions and Scope of Work.
9. Any technical/commercial query pertaining to this Tender should be referred to:

Shri S.N. Purohit
CHIEF GENERAL MANAGER (RE & BO)
Gujarat Industries Power Company Limited
PO:Ranoli-391350,
Dist: Vadodara, Gujarat, India
Tel.:+91-265-2230185 / 2232768/2213
Fax:+91-265-2230029
Email: solar@gipcl.com, snpurohit@gipcl.com

10. Bidders who wish to participate in this tender will have to procure or should have legally valid Digital Certificate (Class III) as per Information Technology Act-2000, using which they can sign their electronic bids. Bidders can procure the same from any of the license certifying Authority of India or can contact (n)code solutions-a division of GNFC Limited, who are licensed Certifying Authority by Government of India at address mentioned below.



Bidder may go through the e-tendering instruction for online Bid participation through n-procure platform for further details and guidance for participation in the tendering process through e-tendering.

In case of any further information regarding online bidding or if a Bidder needs any assistance in accessing/ submission of online bid/ clarification or if training is required for participating in online e-reverse bidding, then the Bidder can contact the following office for assistance or training:

(n) Procure Cell, (n) code solutions-A division of GNFC Ltd.,
403, GNFC Info tower, S.G. Road,
Bodakdev Ahmedabad – 380054 (Gujarat)
Toll Free: 1-800-419-4632 / 1-800-233-1010,
Phone No. 079-26857315 / 316 / 317,
Fax: 079-26857321 / 40007533, Email: nprocure@gnvfc.net

Bidder may visit <https://www.nprocure.com/html/faq.asp> for information regarding e-tendering registration process.

To participate in e-Reverse Auction, bidders have to create e-Auction USER ID on www.auction.nprocure.com and it is mandatory to submit the same alongwith physical Technical bid (In EMD cover); so that the bidder shall be allowed to participate the e-Reverse Auction.

11. **Tender Documents (PDF Format) can be downloaded from Web site <https://www.nprocure.com>, <https://gipcl.nprocure.com> or <http://www.gipcl.com>.**
12. GIPCL reserve the rights to accept/reject any or all Tenders without assigning any reasons thereof. Bidders are requested to be in touch with above-mentioned websites till opening of the Price Bid to know the latest status.

Yours faithfully,

For and behalf of Gujarat Industries Power Company Limited.

(S.N.Purohit)

Gujarat Industries Power Company Limited

PO: Ranoli-391350,

Dist.: Vadodara, Gujarat, India

--- End of Section ---



Document Checklist

[Note: Document Checklist shall be attached with Appendix 1 of the Technical Bid]

| Sr. | Document | Attached? (Yes/ No) | For Official Use |
|-----|---|------------------------|---------------------|
| 1. | Complete sets of Bids (original and copies) | | |
| 2. | Signed Tender Documents in Cover-I | | |
| 3. | Demand Draft of Tender Fees | | |
| 4. | Document as per Clause No. 3.2 | | |
| 5. | Enclosures of the Bid including the Covering Letter as per the format prescribed in Appendix 1: Appendix 1: Format for Covering Letter Cover-II | | |
| 6. | Details of Bidder as specified in Appendix 2 | | |
| 7. | Details of Similar Technical Experience as per Appendix 3 | | |
| 8. | Format of Disclosure of PV Technology Proposed as per Appendix 4 | | |
| 9. | Project Plan as mentioned in Appendix 5: Format for Project Execution Plan. | | |
| 10. | Submission of Technical Document as per Appendix 7 | | |
| 11. | Details of qualified technical staff as per the format in Appendix 8 | | |
| 12. | Declaration of Compliance as per the format in Appendix 9 | | |
| 13. | No Deviation Certificate as per the format in Appendix 10 | | |
| 14. | Declaration on Bidders Reaction to Directors as per the format in Appendix 11 | | |
| 15. | Summary of Audited Financial statements as per the format in Appendix 13 | | |
| 16. | Authorization by Parent Company as per the format in Appendix 14 | | |
| 17. | EMD in the form of Demand Draft or/and Bank Guarantee as per format prescribed in Appendix 18 (a): Format of Bank Guarantee for EMD | | |
| 18. | Attested copy of Service Tax Registration Certificate of Bidder. | | |



| | | | |
|------------|---|--|--|
| 19. | Attested copy of Provident Fund Code of Bidder. | | |
| 20. | Attested copy of PAN Card for Bidder. | | |
| 21. | Certificate of Commencement of Business issued by the Registrar of Companies for Bidder. | | |
| 22. | Power of Attorney by the Bidder in favour of Bidder as per format prescribed in Appendix 12 | | |
| 23. | Bill of Quantities with Specifications / Make etc. as per Tender/RFP | | |
| 24. | Copy of this RFP and amendments (if any) with sign and official seal on every page | | |
| 25. | A comprehensive project management schedule in the form of Gantt Chart for execution plan | | |
| 26. | Format for Undertaking as per Appendix 21 | | |



Disclaimer

- A. The information contained in this Request for Proposal (“RFP”) or subsequently provided to Bidder(s), in documentary or in any other form, by or on behalf of GIPCL, any of their employees or advisors, is provided to Bidder(s) on the terms and conditions set out in this RFP and such other terms and conditions subject to which such information is provided.
- B. This RFP is not an agreement and is neither an offer nor invitation by GIPCL to the prospective Bidders or any other person. The purpose of this RFP is to provide interested parties with information that may be useful to them in the formulation of their Bid for qualification pursuant to this RFP. This RFP includes statements, which reflect various assumptions and assessments arrived at by GIPCL or their advisors or employees or agents, in relation to the Project. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This RFP may not be appropriate for all persons, and it is not possible for GIPCL, their employees or advisors to consider the investment objectives, financial situation and particular needs of each party who reads or uses this RFP.
- C. The assumptions, assessments, statements and information contained in this RFP may not be complete, accurate, adequate or correct. Each Bidder should therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this RFP and obtain independent advice from appropriate sources.
- D. Information provided in this RFP to the Bidder(s) is on a wide range of matters, some of which depends upon interpretation of law. The information given is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. GIPCL would not have any responsibility for the accuracy or otherwise for any interpretation or opinion on law expressed herein.
- E. GIPCL, their employees and advisors make no representation or warranty and shall have no liability to any person, including any Bidder or Bidder(s), under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this Bid or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of the RFP and any assessment, assumption, statement or information contained therein or deemed to form part of this RFP or arising in any way with prequalification of Bidders for participation in the Bidding process.



- F. GIPCL also accept no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance of any Bidder upon the statements contained in this RFP. GIPCL may, in their respective absolute discretion but without being under any obligation to do so, update, amend or supplement the information, assessment or assumptions contained in this RFP.
- G. The issuance of this RFP does not imply that GIPCL is bound to select and short-list prequalified Bids for Bid Stage (the “Bid Stage”) or to appoint the selected Bidder, as the case may be, for the Project[s] and GIPCL reserves the right to reject all or any of the Bid or Bids without assigning any reasons whatsoever.
- H. The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the GIPCL or any other costs incurred in connection with or relating to its Bid proposal. All such costs and expenses will remain with the Bidder and the GIPCL shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the Bid proposal regardless of the conduct or outcome of the Bidding process.

Table of Contents

| | |
|--|-----------|
| SECTION-1: NOTICE INVITING TENDER (NIT) | 3 |
| DOCUMENT CHECKLIST | 14 |
| DISCLAIMER | 16 |
| 1. DEFINITION& INTERPRETATION | 22 |
| 1.1 DEFINITIONS | 22 |
| 1.2 INTERPRETATIONS | 27 |
| 2. INTRODUCTION | 29 |
| 2.1 ABOUT THE COMPANY | 29 |
| 2.2 ABOUT THE PROJECT | 30 |
| 3. INSTRUCTION TO BIDDERS | 31 |
| 3.1 GENERAL INSTRUCTIONS | 31 |
| 3.2 PRE-QUALIFYING REQUIREMENTS (PQRs)/ ELIGIBILITY CONDITIONS | 33 |
| 3.3 LOCAL CONDITIONS | 36 |
| 3.4 LOCAL REGULATORY FRAME WORK | 38 |
| 3.5 CLARIFICATIONS TO TENDER DOCUMENT | 38 |
| 3.6 AMENDMENTS TO TENDER DOCUMENT | 38 |
| 3.7 ACCEPTANCE OF BIDS | 39 |
| 3.8 WITHDRAWAL OF INVITATION TO BID | 39 |
| 3.9 REPRESENTATIVE/ AGENT OF BIDDER | 39 |
| 3.10 FINANCIAL PROPOSAL AND CURRENCIES | 39 |
| 3.11 BANK GUARANTEES& EMD | 39 |
| 3.12 PROJECT MANAGEMENT CONSULTANT AND THIRD-PARTY INSPECTION AGENCY | 43 |
| 3.13 RIGHT TO ACCEPT OR REJECT ANY OR ALL BIDS | 43 |
| 3.14 NET ELECTRICAL ENERGY GENERATION GUARANTEE (NEEGG) | 44 |
| 4. SUBMISSION OF BID | 46 |
| 4.1 GENERAL TERMS | 46 |
| 4.2 FORMAT AND SIGNING OF BID | 47 |
| 4.3 SEALING AND MARKING OF BID | 47 |
| 4.4 ENCLOSURES OF THE BID | 48 |
| 4.5 BID DUE DATE | 52 |
| 4.6 LATE BIDS | 52 |
| 4.7 CONFIDENTIALITY | 52 |
| 4.8 CORRESPONDENCE WITH THE BIDDER | 52 |
| 4.9 BID OPENING AND EVALUATION | 52 |
| 4.10 TESTS OF RESPONSIVENESS | 53 |
| 4.11 MODIFICATION AND WITHDRAWAL OF BIDS | 53 |
| 4.12 EVALUATION OF BID AND SELECTION OF BIDDER | 54 |
| 4.13 CONTACTS DURING BID EVALUATION | 56 |
| 4.14 EMPLOYMENT OF OFFICIALS/ Ex-OFFICIAL OF THE OWNER | 56 |
| 4.15 DECLARATION ON BIDDER'S RELATION TO DIRECTORS | 56 |



| | | |
|-----------|---|------------|
| 4.16 | LETTER OF INTENT ("LOI") AND NOTIFICATION TO PROCEED | 56 |
| 4.17 | PERFORMANCE GUARANTEE..... | 57 |
| 4.18 | FRAUDULENT PRACTICES | 58 |
| 5. | SCOPE OF WORK..... | 59 |
| 5.1 | GENERAL SCOPE OF WORK..... | 59 |
| 5.2 | CIVIL WORK | 77 |
| 5.3 | DETAILED ELECTRICAL WORK (FOR 75 MW (AC) SOLAR PROJECT) | 114 |
| 6. | GENERAL TERMS AND CONDITIONS..... | 239 |
| 6.1 | USE OF CONTRACT DOCUMENTS & INFORMATION..... | 239 |
| 6.2 | PATENT RIGHTS | 239 |
| 6.3 | MATERIALS AND WORKMANSHIP | 239 |
| 6.4 | INTER-CHANGEABILITY | 240 |
| 6.5 | PACKING AND MARKING | 240 |
| 6.6 | NEGLIGENCE | 240 |
| 6.7 | STATUTORY RESPONSIBILITY | 241 |
| 6.8 | INSOLVENCY AND BREACH OF CONTRACT..... | 241 |
| 6.9 | TIMELINE (BEST EFFORT SCHEDULE)..... | 242 |
| 6.10 | DELAY IN EXECUTION OR FAILURE TO SUPPLY..... | 243 |
| 6.11 | LIQUIDATED DAMAGES FOR DELAY AND UNDERPERFORMANCE | 244 |
| 6.12 | PENALTY / INCENTIVE FOR GENERATION DURING OPERATION & MAINTENANCE (O&M) | 247 |
| 6.13 | DEFECT LIABILITY..... | 249 |
| 6.14 | TERMINATION FOR DEFAULT | 251 |
| 6.15 | BREACH AND CANCELLATION OF THE CONTRACT..... | 251 |
| 6.16 | FORCE MAJEURE | 252 |
| 6.17 | PROGRESS REPORT OF WORK | 253 |
| 6.18 | INSURANCE | 253 |
| 6.19 | STATUTORY ACTS, RULES AND STANDARDS | 254 |
| 6.20 | TOOLS AND TACKLES | 254 |
| 6.21 | SAFETY MEASURES | 254 |
| 6.22 | HAZARDOUS MATERIAL | 255 |
| 6.23 | STOPPAGE OF WORK..... | 255 |
| 6.24 | HINDRANCE REGISTER | 255 |
| 6.25 | RESPONSIBILITY OF THE CONTRACTOR..... | 255 |
| 6.26 | RIGHT OF THE OWNER TO MAKE CHANGE(S) IN DESIGN..... | 255 |
| 6.27 | MANUALS | 255 |
| 6.28 | GOVERNING LANGUAGE | 256 |
| 6.29 | ORDER AMENDMENTS..... | 256 |
| 6.30 | ASSIGNMENTS OR SUBLETTING OF CONTRACT..... | 256 |
| 6.31 | SUBCONTRACTS | 256 |
| 6.32 | INSPECTION AND TESTING..... | 256 |
| 6.33 | AUTHORIZED TEST CENTRES..... | 259 |
| 6.34 | DELIVERY OF EQUIPMENT | 259 |
| 6.35 | LIABILITIES DURING TRANSIT..... | 260 |
| 6.36 | DEDUCTION FROM CONTRACT PRICE | 260 |
| 6.37 | TERMS OF PAYMENT (FOR 75 MW (AC) PROJECT) | 260 |
| 6.38 | PAYMENTS PROCEDURE | 263 |
| 6.39 | WARRANTY/ GUARANTEE..... | 264 |

| | | |
|-----------|---|------------|
| 6.40 | ARBITRATION | 267 |
| 6.41 | COURT OF COMPETENT JURISDICTION | 268 |
| 6.42 | LAW AND PROCEDURE | 268 |
| 6.43 | CONSTRUCTION OF CONTRACT | 268 |
| 6.44 | NOTICES | 268 |
| 6.45 | FINAL BILL | 269 |
| 6.46 | DEGRADATION OF SOLAR MODULES | 269 |
| 6.47 | RISK PURCHASE | 270 |
| 6.48 | CONFIDENTIAL INFORMATION | 270 |
| 6.49 | LIMITATION OF LIABILITY (LLP) | 272 |
| 7. | SPECIAL TERMS AND CONDITION | 273 |
| 7.1 | DEFINITION | 273 |
| 7.2 | COMPLIANCE WITH GUVNL/GETCO/GEDA GUIDELINES | 273 |
| 7.3 | PROJECT SITE | 273 |
| 7.4 | SCOPE OF SERVICE | 273 |
| 7.5 | TRAINING OF GIPCL'S PERSONNEL | 274 |
| 7.6 | MODE OF EXECUTION | 274 |
| 7.7 | PROGRAMME OF WORK | 274 |
| 7.8 | STARTING OF WORK | 274 |
| 7.9 | COMPLETION SCHEDULE | 274 |
| 7.10 | SITE INSPECTION & BASIS OF BID | 275 |
| 7.11 | PRICE ESCALATION | 275 |
| 7.12 | TAXES AND DUTIES | 275 |
| 7.13 | PROCUREMENT OF MATERIALS | 277 |
| 7.14 | SAMPLES | 277 |
| 7.15 | NOTICE OF OPERATION | 277 |
| 7.16 | REJECTION OF MATERIALS | 277 |
| 7.17 | POWER AND WATER SUPPLY DURING CONSTRUCTION | 277 |
| 7.18 | LABOUR ENGAGEMENT | 278 |
| 7.19 | HANDING OVER –TAKING OVER | 278 |
| 7.20 | TERMINATION ON THE DEATH OF CONTRACTOR | 279 |
| 7.21 | RETIRED GOVERNMENT SERVANTS TAKING TO CONTRACT | 279 |
| 7.22 | EPF | 279 |
| 7.23 | MISCELLANEOUS | 280 |
| | APPENDIX 1: FORMAT FOR COVERING LETTER | 282 |
| | APPENDIX 2: DETAILS OF BIDDER | 286 |
| | APPENDIX 3: FORMAT OF DETAILS OF SIMILAR TECHNICAL EXPERIENCE | 288 |
| | APPENDIX 4: FORMAT OF DISCLOSURE OF PV TECHNOLOGY PROPOSED | 290 |
| | APPENDIX 5: FORMAT FOR PROJECT EXECUTION PLAN | 292 |
| | APPENDIX 6: BID EVALUATION CRITERIA (BEC) FOR 75 MW (AC) SOLAR PROJECT | 293 |
| | APPENDIX 7: SUBMISSION OF TECHNICAL DOCUMENT | 296 |
| | APPENDIX 8: DETAILS OF QUALIFIED TECHNICAL STAFF | 301 |
| | APPENDIX 9: DECLARATION OF COMPLIANCE | 302 |

| | |
|---|------------|
| APPENDIX 10: NO DEVIATION CERTIFICATE..... | 303 |
| APPENDIX 11: DECLARATION ON BIDDER'S RELATION TO DIRECTORS..... | 304 |
| APPENDIX 12: FORMAT OF POWER OF ATTORNEY AS AUTHORIZED SIGNATORY | 305 |
| APPENDIX 13: FORMAT OF SUMMARY OF AUDITED FINANCIAL STATEMENTS..... | 307 |
| APPENDIX 14: FORMAT OF AUTHORIZATION BY PARENT COMPANY | 309 |
| APPENDIX 15: FORMAT OF FINANCIAL PROPOSAL..... | 311 |
| APPENDIX 16: PROCEDURE FOR PERFORMANCE TESTING | 323 |
| APPENDIX 17: LIST OF BANKS (FOR BANK GUARANTEE) | 329 |
| APPENDIX18 (A): FORMAT OF BANK GUARANTEE FOR EMD..... | 330 |
| APPENDIX 18 (B): FORMAT OF BANK GUARANTEE FOR SECURITY DEPOSIT/ PERFORMANCE BANK GUARANTEE | 333 |
| APPENDIX18 (C): FORMAT OF BANK GUARANTEE FOR PERFORMANCE FOR O&M..... | 336 |
| APPENDIX 19: CONTRACT AGREEMENT (TO BE ENTERED SEPARATELY WITH GIPCL FOR THEIR RESPECTIVE PROJECTS)..... | 339 |
| APPENDIX 20: FORMAT FOR PRE-BID QUERIES | 342 |
| APPENDIX 21: FORMAT FOR UNDERTAKING | 343 |
| ANNEXURE-A1: DETAILS OF SITE | 344 |
| ANNEXURE-A2: ADVANCE PAYMENT GUARANTEE..... | 346 |
| ANNEXURE-A3: PLOT DETAILS OF 75 MW (AC) SOLAR PROJECT..... | 348 |
| ANNEXURE-A4: (FENCING)..... | 349 |
| ANNEXURE-A5: SOIL INVESTIGATION REPORT | 350 |
| ANNEXURE-A6: WATER TEST REPORT | 351 |
| ANNEXURE A7: OPERATION AND MAINTENANCE | 352 |
| ANNEXURE A8: GUVNL TENDER & PPA AND OTHER DOCUMENTS..... | 358 |

1. Definition & Interpretation

1.1 Definitions

The following words and expressions shall have the meanings hereby assigned to them:

- 1.1.1 “Actual Energy Delivered” means the net energy in kilo-watt hour (kWh) from 75MW (AC), solar PV plant as measured at the Metering Point.
- 1.1.2 “Adjudicator” means the person, who shall be an engineer or a firm of engineers who is appointed by the Company to act as the adjudicator to make a decision on or to settle any dispute or difference between the Company and the Contractor referred to it or her by the parties pursuant to RFP (Adjudicator) hereof.
- 1.1.3 “Applicable Law” means any statute, law, regulation, ordinance, notification, rule, regulation, judgment, order, decree, bye-law, approval, directive, guideline, policy, requirement or other governmental restriction or any similar form of decision of, or determination by, or any interpretation or administration having the force of law in the Republic of India and the State Government, by any Government Authority or instrumentality thereof, whether in effect as of the date of this Contract or thereafter.
- 1.1.4 “Base NEEGG” for a year is calculated by using the Net Electrical Energy Generation Guarantee (NEEGG) quoted in the Bid offer by the Contractor adjusted with a correction factor to take into account the actual average global solar radiation measured by the calibrated pyranometer for that year.
- 1.1.5 “Bid” shall mean the bid submitted by the Bidder in response to the RFP/Tender Document No. “GIPCL/Solar/EPC/2022/75 MW (AC) Solar” issued by the Company.
- 1.1.6 “Bidder” shall mean Bidding Company or a Bidding Individual submitting the Bid. Any reference to the Bidder includes Bidding Company / Bidding Individual including its successors, executors and permitted assigns severally, as the context may require;
- 1.1.7 “Commissioning” means the satisfactory, continuous and uninterrupted operation of the equipment/system as specified after all necessary statutory approvals, initial tests, checks and adjustments for a period of at least 3 days to the satisfaction of the Company and necessary certificates are issued by the all concerned/ nodal agencies appointed by appropriate authority/Government.



- 1.1.8 “Completion” means that the Facilities (or a specific part thereof where specific parts are specified in the Scope of Work) have been completed operationally and structurally and put in a tight and clean condition and that all work in respect of Commissioning of the Facilities or such specific part thereof has been completed as per the Scope of Work.
- 1.1.9 “Company” means Gujarat Industries Power Company Limited (GIPCL) and includes the legal successors or permitted assigns of the Company.
- 1.1.10 “Contract” or “Contract Agreement” means the Contract signed between the Company (GIPCL) and the Contractor to execute the entire Scope of Work as given in Appendix 19: Contract Agreement.
- 1.1.11 “Contract Documents” means the documents listed in Appendix 19: Contract Agreement.
- 1.1.12 “Contractor” means the person(s) whose bid to perform the Contract has been accepted by the Company and is named as such the Contract Agreement, and includes the legal successors or permitted assigns of the Contractor.
- 1.1.13 “Contractor’s Equipment” means all plant, facilities, equipment, machinery, tools, apparatus, appliances or things of every kind required in or for installation, completion and maintenance of Facilities that are to be provided by the Contractor, but does not include Plant and Equipment, or other things intended to form or forming part of the Facilities.
- 1.1.14 “Capacity Utilization Factor (CUF)” shall have the same meaning as provided in CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009 as amended from time to time.
- 1.1.15 “Chartered Accountant” shall mean a person practicing in India or a firm whereof all the partners practicing in India as a Chartered Accountant(s) within the meaning of the Chartered Accountants Act, 1949.
- 1.1.16 “Completion Certificate” shall mean the certificate to be issued by the owner or his representative when the works have been completed to his satisfaction.
- 1.1.17 “Commercial Operation Date” (COD): with respect to the Project/Unit shall mean the date on which the project / unit is commissioned (certified by GEDA) and available for

commercial operation and such date as specified in a written notice given at least 10 days in advance by the EPC Contractor to Owner /GUVNL.

1.1.18 “Day” means calendar day of the Gregorian calendar.

1.1.19 “Delivery Point” shall be the interconnection point at which solar power developer (SPD), GIPCL shall deliver the power to the Gujarat State Transmission Unit substation. The metering shall be done at this point of interconnection.

1.1.20 “Defect Liability Period” means the period of validity of the warranties given by the Contractor, during which the Contractor is responsible for defects with respect to the Facilities (or the relevant part thereof) as provided in Clause No. 6.13 (Defect Liability) hereof.

1.1.21 “Effective Date” for this Contract shall mean the date of issuance of Letter of Intent by the Company.

1.1.22 “Facilities” means the Plant and Equipment to be supplied and installed, as well as all the Installation Services to be carried out by the Contractor under the Contract for enabling the installation, construction, testing and commissioning of the Solar Power System(s).

1.1.23 “GEDA” means the Gujarat Energy Development Agency

1.1.24 “GCC” means the General Conditions of Contract hereof.

1.1.25 “Government Authority” means Government of India, any state government or any governmental department, commission, board, body, bureau, agency, authority, undertaking, court or other judicial or administrative body or any sub-division or instrumentality thereof, central, state, or local, having jurisdiction over the Contractor, the Facility, or the performance of all or any of the services, obligations or covenants of Contractor under or pursuant to this Contract or any portion thereof.

1.1.26 “Guarantee Test(s)” means the Performance & Guarantee test(s) specified in the (Guarantee Test) to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees.

1.1.27 “GUVNL” means Gujarat Urja Vikas Nigam Limited



1.1.28 “GIPCL” means Gujarat Industries Power Company Limited

1.1.29 “Installation Services” means all those services ancillary to the supply of the Plant and Equipment for the Facilities, to be provided by the Contractor under the Contract; e.g., transportation and provision of marine or other similar insurance, inspection, expediting, Site preparation works (including the provision and use of Contractor’s Equipment and the supply of all civil, structural and construction materials required), installation, Commissioning, carrying out guarantee tests, operations, maintenance, the provision of operations and maintenance manuals, training of Company's personnel etc.

1.1.30 “Month” means calendar month of the Gregorian calendar.

1.1.31 “MNRE” means Ministry of New and Renewable Energy, Government of India.

1.1.32 “O&M” means Operations and Maintenance.

1.1.33 “Owner” means Gujarat Industries Power Company Limited (GIPCL)

1.1.34 “Plant Capacity” is defined as 75 MW(AC) Grid-Connected Solar Photovoltaic Power Plant proposed near Surat Lignite Power Plant of GIPCL, Dist. Surat, Gujarat as per the provisions in this Tender including but not limited to its design, engineering, procurement & supply, construction, commissioning (COD with GEDA/ GUVNL), comprehensive operation and maintenance.

1.1.35 “Project Manager” means the person appointed by the Company in the manner provided in the RFP (Project Manager) hereof and named to perform the duties delegated by the Company.

1.1.36 “Prudent Utility Practices” means those practices, methods, techniques and standards, that are generally accepted for use in electric utility industries taking into account conditions in India, and commonly used in prudent electric utility engineering and operations to design, engineer, construct, test, operate and maintain equipment lawfully, safely, efficiently and economically as applicable to power stations of the size, service and type of the Project, and that generally conform to the manufacturer’s operation and maintenance guidelines.

“RFP document” shall mean the bidding document issued by the Company including all attachments vide RFP No. GIPCL/Solar/EPC/2022/75 MW (AC) Solar

- 1.1.37 “Site” means the land and other places upon which the Facilities are to be installed, and such other land or places as may be specified in the Contract as forming part of the Site.
- 1.1.38 “Solar Power System(s)” means the solar photovoltaic grid interactive power system(s) to be established at the site specified in the RFP.
- 1.1.39 “Subcontractor”, including vendors, means any person to whom execution of any part of the Facilities, including preparation of any design or supply of any Plant and Equipment, is sub-contracted directly or indirectly by the Contractor, and includes its legal successors or permitted assigns.
- 1.1.40 “Successful Bidder” means the bidder who has been awarded the Contract and described as Contractor for the “Project”.
- 1.1.41 “Time for Completion” shall be the date on or before which Commissioning of the Facility has to be achieved to the satisfaction of the Company and such date is specified in NIT.
- 1.1.42 “Inter Connection Point/ Delivery/Metering Point” means Metering Point for 75 MW (AC) Solar Plant shall be at 66 kV GETCO substation at Village Mosali, Dist. Surat including the dedicated transmission Lines/cables connecting the solar power project with GETCO/Pooling substation. Metering shall be done at this interconnection point at the substation where the power is injected into the substation i.e. the delivery point. For interconnection with grid and metering, the EPC Contractor shall abide by the relevant CERC regulation, GERC regulations, Grid code and Central Electricity Authority (Installation and Operation Meters) Regulation, 2006 as amended and revised from time to time

OR

“Inter Connection Point/Delivery / Metering Point” means Metering Point for 75MW (AC) Solar Plant shall be at 220kV Surat Lignite Power Plant’s Switchyard at Village: Nani Naroli, Dist: Surat including the dedicated transmission lines/ cables connecting the solar power project with Switchyard as per the GETCO requirement. Metering shall be done at this interconnection point at the substation where the power is injected into the substation



i.e. the delivery point. For interconnection with grid and metering, the EPC Contractor shall abide by the relevant CERC regulation, GERC regulations, Grid code and Central Electricity Authority (Installation and Operation Meters) Regulation, 2006 as amended and revised from time to time

1.2 Interpretations

- 1.2.1 Language: Unless otherwise agreed by the parties in writing, the parties shall use the English language and the Contract and the other Bid documents, all correspondence and communications to be given, and all other documentation to be prepared and supplied under the Contract shall be written in English, and the Contract shall be construed and interpreted in accordance with that language. If any of the Contract Documents, correspondence or communications are prepared in any language other than English, the English translation of such documents, correspondence or communications shall prevail in matters of interpretation.
- 1.2.2 Singular and Plural: The singular shall include the plural and the plural the singular, except where the context otherwise requires.
- 1.2.3 Headings: The headings and marginal notes in the General Conditions of Contract are included for ease of reference, and shall neither constitute a part of the Contract nor affect its interpretation.
- 1.2.4 Persons: Words importing persons or parties shall include firms, corporations and government entities.
- 1.2.5 Men: The word 'Men' in this RFP shall mean all genders i.e. male, female and others.
- 1.2.6 Entire Agreement: The Contract constitutes the entire agreement between the Company and Contractor with respect to the subject matter of Contract and supersedes all communications, negotiations and agreements (whether written or oral) of parties with respect thereto made prior to the date of Contract. The various documents forming the Contract are to be taken as mutually explanatory. Should there be any discrepancy, inconsistency, error or omission in the Contract documents, the matter may be referred to the Adjudicator and the Contractor shall carry out work in accordance with the decision of the Adjudicator.



1.2.7 Amendment: No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party hereto.

1.2.8 Independent Contractor: Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed.

- i. All employees, representatives or Subcontractors engaged by the Contractor in connection with the performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Company and nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives or Subcontractors and the Company.
- ii. Not in any case the sub-contractor shall claim or shall put any binding to the Company and the sub-contractor must be handled by the Contractor and the Company shall not be responsible for any claims at any time by the Contractor in relation to the sub-contractor.

1.2.9 Non-Waiver

- i. Subject to Clause 1.2.6 (ii) below, no relaxation, forbearance, delay or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.
- ii. Any waiver of a party's rights, powers or remedies under the Contract must be in writing, must be dated and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

1.2.10 Severability: If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

1.2.11 Country of Origin: "Origin" means the place where the materials, equipment and other supplies for the Facilities are mined, grown, produced or manufactured, as the case may be, and from which the services are provided. This shall be according to MNRE guidelines.

2. Introduction

2.1 About the Company

2.1.1 About GIPCL

GIPCL (the “Company”) was incorporated in 1985 as Public Limited Company and engaged in business of Electrical Power Generation. The total present capacity of Vadodara (310 MW Gas based + 1 MW Solar + 112.4 MW Wind), Mangrol (500 MW Lignite based + 5 MW Solar + 1 MW Solar), Gujarat Solar Park-Charanka (80 + 75 MW Solar) and Raghanesda Ultra Mega Solar Park (100 MW Solar) plants is 1184.4 MW. The company is having its registered office at P.O. Ranoli, Vadodara, Gujarat.

The Company commissioned first power project; a 145 MW gas based Combined Cycle Power Plant in February, 1992 at Vadodara. The Company expanded its capacity and commissioned 165 MW Naphtha & Gas based Combined Cycle Power Plant at Vadodara in November, 1997 as Independent Power Producer (IPP) with Power Purchase Agreement (PPA) with GUVNL.

GIPCL commissioned 250 MW (SLPP Phase-I : 2x125 MW) Lignite based Power Plant at NaniNaroli, District Surat in November, 1999 as Independent Power Producer (IPP) with Power Purchase Agreement (PPA) with GUVNL. The Company also has its own Captive Lignite Mines at Vastan, Mangrol&Valia for Surat Lignite Power Plant. Further, SLPP Phase-II: 2 x 125 MW has been commissioned in April 2010.

GIPCL commissioned 112.4 MW Wind Power Project in the State of Gujarat.

GIPCL is in the business of solar power since 2012 and 5 MW photovoltaic Grid connected Solar Power Plant commissioned at Vastan Mines of Surat Lignite Power Station in January 2012. GIPCL has also commissioned 1 MW Distributed Solar Pilot Project at two locations, (i) Village: Amrol, Anand and (ii) Village: Vastan, Taluka: Mangrol in month of April-2016.

GIPCL has commissioned 2x40 MW (AC) Solar PV Project in the month of August-2017 and 75 MW (AC) Solar PV Power Project in the month of June-2019 at Gujarat Solar Park, Charanka. Further another 100 MW (AC) Solar Project was commissioned in the month of August-2021 at Raghanesda Ultra Mega Solar Park, Village Raghanesda, Dist.: Banaskantha, Gujarat.

For detailed profile of company and past financial results, bidders may visit our website: www.gipcl.com.



2.2 About the Project

- 2.2.1 The Gujarat Industries Power Company Limited (GIPCL) is planning to develop 75MW (AC) solar project at Land available near our Surat Lignite Power Plant, Dist: Surat. GIPCL intends to participate in GUVNL's RfS for development of solar project at in Gujaarat. Further, GIPCL has also other Promotors, who are interested to buy a power from the 75MW Solar Project. Above project including development of land, buildings, plant, machinery, ancillary equipment, material, switchgear, transformers, Power evacuation, Transmission line, protection equipment and the development, design, construction, operation and maintenance for three (3) year (i.e.3 years after date of Commissioning and COD with GEDA/GUVNL) of the Power Plant is hereinafter referred to as the (the "Project") at Surat Lignite Power Plant of GIPCL. The Company has now decided to undertake a competitive Bidding process for selection of the EPC Contractor to implement the Project (the "Contractor").
- 2.2.2 The details of the facilities which the Company requires to be set up in the present instance and for which Bids are hereby invited are described in this Request for Proposal (RFP). The overall responsibility of complete Scope of Work rests with the Bidder.

--- End of Section---

3. Instruction to Bidders

3.1 General Instructions

- 3.1.1 The current document is the request for proposal, which is issued to all the potential Bidders, requesting a proposal for implementation of the Project on a fixed price basis. A Contractor would be selected through competitive bidding process for execution of the Project.
- 3.1.2 The Owner expects Bidders to confirm compliance to RFP terms, conditions and specifications at the time of submission of Bids, failing which the Bids are liable to be rejected. Hence, the Bidders in their own interest are advised to submit their Bids complete in all respects conforming to all terms and conditions of this RFP.
- 3.1.3 Before submitting the Tender, the instructions may be read carefully regarding submission of Tender. If any bidder finds discrepancies or omissions in the Tender documents or is in doubt as to the true meaning of any part, he shall clarify same from the Tender issuing office in writing before the due date of submission of the queries.
- 3.1.4 Bids shall be evaluated based on the information/documents available in the Bid. Hence, Bidders are advised to ensure that they submit appropriate and relevant supporting documentation along with their proposal in the first instance itself. Bids not complying with the requirements of this RFP are liable to be rejected without any further opportunity.
- 3.1.5 Bidders need to ensure that in the event the Project is awarded to it, and during execution of the Project, it shall not seek to alter any agreed contractual terms, conditions and specifications.
- 3.1.6 All Bids must be accompanied by a Tender fee and EMD of value as specified in the NIT in the form and manner as specified in the RFP document and must be delivered along with Bids.
- 3.1.7 The specification provided with this RFP outlines the functional requirement. The Bidder must submit a Proposal based upon their own design, meeting the functional requirements.
- 3.1.8 Bidders shall deploy the latest state-of-the-art technology and must ensure that the goods supplied are new, unused and of most recent or current models and incorporate all recent improvements in design and materials for the implementation of the Project.



- 3.1.9 This 'Instructions to Bidders', in original, issued along with RFP document, shall be submitted by the Bidder along with Bid duly signed by the Bidder as the token of acceptance. Bid sent without having the prescribed RFP document and without complying with the terms and conditions of RFP shall be ignored.
- 3.1.10 Issuance of this RFP does not construe that the Bidder has been short-listed or qualified.
- 3.1.11 The Owner reserves the right, to accept or reject any Bid and to annul the bidding process and reject all Bids at any time prior to award of the Agreement, without assigning any reason thereof and without thereby incurring any liability to the affected Bidder(s).
- 3.1.12 The Owner reserves the right to reject any Bid submitted with deviations beyond the one that is specified and mentioned in the RFP and no time shall be given in any circumstance after opening of Financial Proposal for submission of documents which are missing with Bid.
- 3.1.13 In case of change in ownership of the Project, all the Agreements and Contracts signed with the Owner will stand true and valid with the new Owner of the Project.
- 3.1.14 Tender Issuing Authority reserves the right to cancel the NIT or to change qualifying requirement or to reject any or all the tenders so received without assigning any reason.
- 3.1.15 The entire site for the work shall be made available along with LoI.
- 3.1.16 Canvassing in connection with Tender is strictly prohibited and the Tender submitted by the Bidders who resort to canvassing will be liable to rejection straight way.
- 3.1.17 All rates shall be quoted on the proper form i.e. price bid supplied as part of the Tender documents on e-tender portal by the Department.
- 3.1.18 The Bidder shall quote for 75 MW (AC) Solar PV Power Plant as per the terms and conditions of this Tender and evaluation shall be done based on this quoted value. However, once bidding is completed and Successful Bidder is selected thereafter all the Technical and Commercial work including but not limited to design, engineering, supply, erection, testing, commissioning, PG test, etc. shall be done by for 75 MW(AC) project. Further, Letter of Intent, Work Order, Purchase Order and O&M Order shall be issued by

GIPCL for 75 MW (AC) Project, the Bidder has to submit the Advance, Performance and Operation & Maintenance Bank Guarantee for 75 MW (AC) Project to GIPCL.

3.1.19 The Gujarat Industries Power Company Limited (GIPCL) does not bind itself to accept the lowest Bid and reserves to itself the right to accept the whole or any part of the Tender and the Bidder shall be bound to perform the same at the rate quoted in this Tender.

3.2 Pre-Qualifying Requirements (PQRs)/ Eligibility Conditions

3.2.1 GENERAL

- i. The Bidder shall be a body incorporated in India under the Companies Act, 1956 or 2013 including any amendment thereto. A copy of certificate of incorporation shall be furnished along with the bid in support of above.

3.2.2 TECHNICAL

75 MW (AC) Solar Project:

- i. The Bidder shall have an experience of design, supply, installation, commissioning and operation of solar power plant installation of cumulative installed capacity of 75 MWp or above in India on or after 1 January 2015 as on the Deadline for Submission of Bid, with a execution of plant with minimum capacity as under.
- ii. Out of the above-mentioned 75 MWp, there must at least one solar PV power plant of 60 MWp capacity or two Separate Projects of cumulative capacity of 60 MWp.
- iii. The Bidder shall also submit documentary proof of achievement of performance generation guarantee and performance of at least one solar PV power plant of 30 MWp or above which shall be certified from the Developer of that particular solar PV power plant.
- iv. The Bidder should have experience of executing transmission system project having connectivity up to STU/CTU grid at 66KV Voltage level or above, other than in a Solar Park, either as a part of Solar EPC Project or as a separate transmission project.

Bidder shall submit, in support to the above, the list of projects commissioned along with their work order/ LOI and the commissioning certificates along with the certificate of plant being in operation. In case the bidder wants to meet the eligibility criterion through its own

power plant, then a certificate from Chartered Accountant to that effect will be required to be submitted.

3.2.3 FINANCIAL

- i. Cumulative Turnover of the **Bidder for last three (3) financial years shall be at least as per following table.**

| Project | Cumulative Turnover of the Bidder for last three financial years in Rs. Crs. |
|---------------------|--|
| 75 MW Solar Project | Rs. 350 Crs. |

- ii. The Net Worth of the Bidder during the last Financial Year shall be **positive**, wherein the Net Worth shall be calculated as follows:

Net Worth = (Equity + Reserves) – (Revaluation reserves+ intangible assets + miscellaneous expenses to the extent not written off + carried forward losses).

The Bidder shall provide a copy each of audited annual report to ascertain their turnover & net-worth.

- iii. The Bidder shall submit audited annual report of FYs 2018-19, 2019-20 and 2020-21.
- iv. In case bidding company does not meet financial criteria (Turn over) in such case – Support of Holding Company shall be allowed with additional 5% BG (5% of EPC Price) from holding company.

3.2.4 OTHER CRITERIA FOR QUALIFICATION

- i. The Tender of only those Bidders will be considered who will produce documentary proofs, self-attested to meet the following requirements: The Bidders to have valid Proof of Permanent EPF account no., ESI registration no. and Service Tax no.
- ii. The agency should have valid licenses under The Contract Labour (Regulation & Abolition) Act, 1970 & The Contract Labour(P & R)(Gujarat) Rules 1972 and amendment from time to time & as specified under clause no



- 7.18 or should give an undertaking that he will get himself registered within one month if work is allotted to him.
- iii. A self-attested certificate from the Bidder to the effect that the Bidder is not blacklisted from any Public Sector undertakings of Central Govt./ State Govt. /SEBs / Corporations/ GIPCL / GUVNL / GERMI / GETCO etc.
 - iv. The experience list shall include only projects executed by Bidder himself as a turnkey contractor which shall include entire Engineering, Procurement, Supply & Installation and not as a sub-contractor. The list of project executed shall clearly mention name of the technology partner / licensee agreement company and whether the same is valid as on date with date of expiry.
 - v. The Bidder shall ensure that all the information, facts & figures, data provided in the bid are accurate and correct. GIPCL reserves the right to confirm / verify any data or information through their own sources. GIPCL also may contact directly the references given for the project executed and may also visit the site, manufacturing facilities & sub-vendors works etc., physically to ascertain capabilities of the applicant, if so desire at their own cost. Bidder may have to facilitate GIPCL for any such visit.
 - vi. The Bidder shall furnish documentary evidence by way of copies of Contract / Purchase Order, Completion Certificate or any other equivalent document, Audited Balance Sheet and Profit & Loss Account etc., along with the Bid to establish experience / track record and financial capabilities meeting Bid Evaluation Criteria.
 - vii. The Bidder or its Proprietor / Partner(s) / Director(s) of the Firm should not have been convicted by a Court of Law for an offence involving moral turpitude in relation to business dealings during the past seven (7) years.
 - viii. GIPCL shall also take into account past experience of Project execution by Bidder for GIPCL or other reputed developers while carrying out overall due diligence of the proposal and evaluating Bidder in totality to take final call on his selection on following criteria. GIPCL decision regarding the same shall be final & binding to the bidder.
 - ix. Bidder with track record of inordinate delay of any solar project(s) beyond 04(four) months attributable on bidder's part for the scheduled completion period for the project of 30MWp



or above may be disqualified. Bidder shall submit undertaking for the same as part of Bid submission document (As per Appendix - 21)

- x. GIPCL also reserves right to reject or disqualify any bidder at any stage considering its overall performance in past project (s) executed for GIPCL based on reasonable grounds/ reasons for such rejection/disqualification. GIPCL shall be under no obligation to inform the affected Applicants of the rejection and / or ground for rejection.

The Bidder should meet all the above eligibility criteria as on the bid due date. The bids of only those bidders, who meet the Bidder's Eligibility Criteria, will be considered for further evaluation.

Notwithstanding anything stated above GIPCL reserves the right to verify all statements/information submitted to confirm the Bidders claim on experience and to assess the Bidders capability and capacity to perform the contract should the circumstances warrant such an assessment in the overall interest of the project.

Further, notwithstanding the above, GIPCL reserves the right to accept or reject any BID and to annul the process of submission of BID and reject all or any BID, at any time without assigning any reason thereof. GIPCL shall not in any way be responsible or liable for any loss, damage or inconvenience caused to the bidders on account of the rejected bids. GIPCL shall be under no obligation to inform the respective bidder(s) of the rejection and / or ground for rejection.

3.3 Local Conditions

- 3.3.1 The Bidder is advised to visit and examine the site conditions, traffic, 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 obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into the Contract Agreement. The costs of visiting the Site shall be at Bidder's own expense.
- 3.3.2 The Bidder and any of its personnel or agents shall be granted permission by the Owner to enter upon its premises and lands for the purpose of such inspection, but only upon the express condition that the Bidder, its personnel or agents, shall release and indemnify the Owner and its personnel and agents from and against all liability in respect thereof and shall be responsible for personal injury (whether fatal or otherwise), loss of or damage to

property and any other loss, damage, costs and expenses however caused, which, but for the exercise of such permission would not have arisen.

- 3.3.3 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.
- 3.3.4 In no case the date of Time for Completion of 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 of Gujarat Industries Power Company Limited (GIPCL) under the Scheme.
- 3.3.5 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 from the point of manufacture to make sure that its equipment is suitable for the available access and the site terrain.
- 3.3.6 It shall be deemed that by submitting a Bid, the Bidder has:
- a) made a complete and careful examination of the RFP document;
 - b) received all relevant information requested from the Owner;
 - c) 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 Company relating to any of the matters referred to in NIT.
 - d) 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;
 - e) 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 Company, or a ground for termination of the Contract Agreement; and
 - f) Agreed to be bound by the undertakings provided by it under and in terms hereof.

3.3.7 The Company 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 Company.

3.4 Local Regulatory Frame Work

3.4.1 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 Owner shall not entertain any request for clarification from the Bidder, regarding such local conditions.

3.4.2 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 Owner and that neither any change in the time schedule of the Contract nor any financial adjustments arising thereof shall be permitted by the Owner.

3.5 Clarifications to Tender Document

3.5.1 A Bidder requiring any clarification of the Tender documents may notify GIPCL in writing or by facsimile or by e-mail to GIPCL's contact as mentioned in Table-A of NIT:

Shri S.N. Purohit
CHIEF GENERAL MANAGER (RE & BO)
Gujarat Industries Power Company Limited
PO: Ranoli-391 350,
Dist.: Vadodara, Gujarat, India
Tel.:+91-265-2230185 / 2232768/2213
Fax: +91-265-2230029
Email: solar@gipcl.com, snpurohit@gipcl.com

3.6 Amendments to Tender Document

3.6.1 GIPCL may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective Bidder, modify the Tender Documents.

3.6.2 The amendments will be notified on website as mentioned in Notice Inviting e-Tender of this Tender.

3.6.3 In order to allow the prospective Bidder(s), reasonable time in which to take the amendment into account in preparing their Bids, GIPCL at its discretion, may extend the deadline for the submission of Bids.

3.7 Acceptance of Bids

3.7.1 GIPCL neither bind itself neither to accept the lowest nor to assign any reason for the rejection of any Bid. It is also not binding on GIPCL to disclose any analysis report.

3.8 Withdrawal of Invitation to Bid

3.8.1 While GIPCL has floated this Tender and has requested Bidders to submit their proposals, GIPCL shall always be at the liberty to withdraw this invitation to bid at any time before the acceptance of bid offer.

3.9 Representative/ Agent of Bidder

3.9.1 All the Bidders are requested to mention the name of their authorized representative/ agent, if any, with full address in the Bid. In case the representative is changed during the bidding process such changes shall be notified by the Bidder, failing which, GIPCL shall not accept any responsibility.

3.10 Financial Proposal and Currencies

3.10.1 The Bidders shall quote the prices inclusive of all the taxes, while also providing the breakup of taxes as mentioned in Appendix-15 the similar format will be present in the e-tender for online submission. The Bidder shall indicate the price in Financial Proposal in Indian National Rupee only.

3.11 Bank Guarantees & EMD

3.11.1 EMD shall be in the form of Bank Guarantee.

3.11.2 The validity of EMD shall be as mentioned in NIT.

3.11.3 The EMD shall specifically bind the Bidder to keep its Bid valid for acceptance and to abide by all the conditions of the Tender Documents in the event of GIPCL desiring to award the work to the said Bidder. GIPCL shall have an unqualified discretion to forfeit the EMD in the event: (i) Bidder fails to keep the Bid valid up to the date specified/ required; or (ii) refuses to unconditionally accept Letter of Intent and carry out the work in accordance with the Bid in the event such Bidder is chosen as the Successful Bidder.

3.11.4 The Owner shall, however, arrange to release the EMD in respect of unsuccessful Bidders, without any interest, after the acceptance of LOI along with the submission of Security Deposit by successful Bidder.

- The EMD shall be released to bidders in the following manner. The EMD of the Successful Bidder shall be converted to Security Deposit cum Performance Bank Guarantee.
- EMD of the unsuccessful bidders shall be released after releasing the EMD of the Successful Bidder.

3.11.5 The EMD shall be forfeited and appropriated by GIPCL as per the discretion of GIPCL as genuine, pre-estimated compensation and damages payable to GIPCL for, inter alia, time, cost and effort of GIPCL without prejudice to any other right or remedy that may be available to GIPCL hereunder or otherwise, under the following conditions:

- a. If a Bidder engages in a corrupt practice, fraudulent practice, coercive practice, or restrictive practice;
- b. In the case of Successful Bidder, if it fails within 7 days from the issue of LoI – (a) to sign the Contract Agreement and/ or (b) to furnish the Security Deposit cum Performance Bank Guarantee within the period prescribed.
- c. In case the Successful Bidder, having signed the Contract Agreement, commits any breach thereof prior to furnishing the Security Deposit cum Performance Bank Guarantee.

3.11.6 The Successful Bidder shall furnish the following Bank Guarantees:

- i) **Security Deposit cum Performance Bank Guarantee (SD/PBG)** as per the format given in Appendix 18 (b): Format of Bank Guarantee for Security Deposit/ Performance Bank Guarantee, shall be furnished in favour of Gujarat Industries Power Company Limited (GIPCL). The Successful Bidder shall submit Security Deposit cum Performance Bank Guarantee of 10% of 75 MW (AC) EPC Contract Price, within two weeks after issuance of LOIs. The validity period of PBG should be for a total period up to thirty one (31) months from the date of LoI or till the date of successful completion of PG test whichever is later; if required, the PBG shall have to be extended for further 3 months beyond the due date of successful completion of PG test. However, in case Bidder fails to submit PBG within two

weeks after issue of date of LOI, GIPCL reserves the right to cancel LOI and to recover all cost and liability thereof from Bidder. The period for Performance Guarantee Test shall begin from the date mentioned in NIT of this Tender and shall continue till next one (1) year. SD/PBG shall be returned only after successful Performance Guarantee Test/ Final Acceptance Test.

- ii) **O&M Bank Guarantee:** The Contractor shall undertake comprehensive Operation and Maintenance (O&M) activities for a period of three (3) years from the date mentioned in NIT of this Tender. The Contractor shall submit the O&M Bank Guarantees mentioned in the NIT, to GIPCL within 30 days from the date of start of O&M period as specified in the NIT of this Tender in favour of Gujarat Industries Power Company Limited, Vadodara. The format of the O&M Bank Guarantee is given in Appendix 18 (c): Format of Bank Guarantee for Performance for O&M.
- iii) **Bank Guarantee against PV Module Warranty:** The Successful Bidder who is not able to provide insurance of PV modules as specified in the Tender Clause No. 6.39.10 (a) Bank Guarantee of Rs. 25 Lakh per each megawatt of PV modules (i.e. DC capacity) shall be issued by Solar PV Module manufacturer in favour of GIPCL, which shall be valid for a period of twenty five (25) years and 90 days. The minimum validity of the Bank guarantee shall be five (5) years and shall be renewed subsequently every five (5) years prior to thirty (30) days of its expiry. In case the PV module fails to provide power output as per its performance warranty, and if the Contractor fails to rectify, replace or repair the PV module, then the Owner shall carry out the necessary rectification, repair or replacement at its own discretion at the risk and cost of the Contractor. The cost of such rectification, repair or replacement shall be encashed from the Bank Guarantee against PV Module Warranty. The same shall be replenished by the Contractor within thirty (30) day, failing which the entire Bank Guarantee amount shall be encashed and all pending payment shall be withheld by the Owner till such amount is replenished by the Contractor. In another instance, if the Contractor becomes bankrupt or insolvent, then the Owner shall immediately encash the entire amount of the Bank Guarantee against PV Module Warranty the bank guarantee shall be issued by PV Module manufacturer in favour of GIPCL before supply of solar PV Modules.
- iv) **Performance Guarantee Test Run & Bank Guarantee during PG Test for under Generation:**



Contractor shall demonstrate NEEGG (PG Test) after COD. Duration of PG test consist of 12 months readings continuously from start of PG Test. Contractor shall start PG test at any date after COD but not later than 6 months from COD. Contractor will get 02 chance to demonstrate PG test within 3 years after COD of the plant and during O&M Period. It is desirable that contractor shall carry out PG test as early as possible after COD so that necessary correction / DC addition if required can be carried out before attempting 2nd chance. In case contractor fails to achieve the required NEEGG in the second chance, the shortfall in Generation after two PG test shall be adjusted against the Performance Bank Guarantee as per following formula.

1. In case of NEEGG Shortall after 2nd PG test attempt GIPCL will deduct Penalty at the rate of 23.69 X (Shortfall KWH) from Bank Guarantee / Pending payment to the contractor.
2. It is further clarified that the year-on-year shortfalls in achieving the NEEGG during the 1st to 3rd year of O&M Period shall be charged as per Clause No 6.12.2 (Rs. 2.75x Shortfall in KWh) of this Tender Document, which shall be over and above the provision of this current Clause.

For example, after 2nd chance of PG test, , if the Contractor has a shortfall of 100 kWh during the PG test, then the Contractor shall pay penalty of Rs. 2,369/-.

3.11.7 Due to an extended nature of the O&M Bank Guarantee, the Contractor is allowed to provide O&M Bank Guarantees of not less than one (1) year and renew the same each year. However, the Contractor shall renew the O&M Bank Guarantee at least two (2) months before the expiry of the validity failing which GIPCL will be at liberty to encash the same. In case the O&M Bank Guarantee is encashed due to any penalty then the Contractor has to replenish within 20 days the O&M Bank Guarantee for the remaining period.

3.11.8 Any lapse in the timely renewal of the O&M Bank Guarantee shall entitle GIPCL to encash it without assigning any further reason thereof.

3.11.9 The O&M Bank Guarantee should be valid upto 45 days beyond the due date of completion of O&M year. For subsequent O&M years, the Bank Guarantee should be extended/renewed in such a manner that the same remains valid up to 45 days beyond the date of completion of each subsequent O&M year.

3.12 Project Management Consultant and Third-Party Inspection Agency

3.12.1 A Project Management Consultancy (PMC) or Third-Party Inspection agency (TPI) may be appointed by GIPCL, at its sole discretion, to conduct any kind of inspection regarding procurement, fabrication, installation, hook-up, quality, execution, commissioning, operation and maintenance during the span of the Project. The Contractor shall provide necessary access and coordination to conduct such inspections. The Contractor shall provide all necessary access and cooperation for inspection by National or State agency.

3.13 Right to Accept or Reject any or all Bids

3.13.1 Notwithstanding anything contained in this Tender, the Owner reserves the right to accept or reject any Bid and to annul the bidding process and reject all Bids at any time without any liability or any obligation for such acceptance, rejection or annulment, and without assigning any reasons thereof.

3.13.2 The Owner reserves the right to reject any Bid and appropriate the EMD if:

- a. after reviewing the Bid there is doubt that the offered works, materials or equipment are not state of the art and/ or not suitable for the site operating conditions;
- b. at any time, a material misrepresentation is made or uncovered, or
- c. the Bidder does not provide, within the time specified by the Company, the supplemental information sought by Company for evaluation of the Bid.

3.13.3 Such misrepresentation/ improper response shall lead to the disqualification of the Bidder. If such disqualification / rejection occur after the Bids have been opened and the Successful Bidder gets disqualified / rejected, then the Owner reserves the right to:

- a. select the next Bidder with the Lowest Evaluated Bid Value as the Successful Bidder;
- <or>
- b. Take any such measure as may be deemed fit in the sole discretion of the Owner, including annulment of the bidding process.

3.13.4 In case it is found during the evaluation or at any time before signing of the Contract or after its execution and during the period of subsistence thereof, that one or more of the pre-qualification conditions have not been met by the Bidder or the Bidder has made material misrepresentation or has given any materially incorrect or false information, the Bidder shall be disqualified forthwith, if not yet appointed as the Contractor either by issue



of the LoI or entering into of the Contract Agreement, and if the Successful Bidder has already been issued the LoI or has entered into the Contract Agreement, as the case may be, the same shall, notwithstanding anything to the contrary contained therein or in this Tender, be liable to be terminated, by a communication in writing by the Owner to the Contractor, without the Owner being liable in any manner whatsoever to the Bidder or Contractor, as the case may be. In such an event, the Owner shall forfeit and appropriate the bank guarantees without prejudice to any other right or remedy that may be available to the Owner.

3.13.5 The Owner reserves the right to verify all statements, information and documents submitted by the Bidder in response to the Tender Documents. Failure of the Owner to undertake such verification shall not relieve the Bidder of its obligations or liabilities hereunder nor will it affect any rights of the Owner there under.

3.14 Net Electrical Energy Generation Guarantee (NEEGG)

3.14.1 The Bidder shall be required to quote the Net Electrical Energy Generation Guarantee (NEEGG) for three (03) years period at the metering point. The Bidder shall give NEEGG per annum 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 NEEGG, Bidders are required to provide computation documents along with considered factors based on which NEEGG has been computed.

3.14.2 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. Net Electrical Energy Guaranteed Generation. The Site information and solar data provided in this Tender except the reference radiation for the twelve months is only for preliminary information purpose. No claim or compensation shall be entertained on account of this information. It shall be the responsibility of the Bidder to access the corresponding solar insolation values and related factors of solar plant along with expected grid availability. The Bidder should access all related factors about the selected Site for the Project and then quote the NEEGG for the proposed Project.



- 3.14.3 The Contractor shall be responsible for achieving NEEGG. For any shortfall in NEEGG corresponding to the offer, the compensation shall be recovered from the Contractor as per Clause no. 6.12.2. The Contractor shall maintain the Plant equipment including its repair, replacement, overhauling, etc., so as to ensure guaranteed NEEGG per year, for which the Owner shall pay the agreed O&M Contract Price and the applicable taxes. NEEGG guaranteed shall not be construed as limiting value of generation. The Contractor shall maintain such that maximum generation is achieved.
- 3.14.4 The Bids with NEEGG of less than or equal to 16,42,50,000 kWh (Sixteen Crore Forty Two Lacs Fifty Thousands kilo-Watt hours) for the first year for 75 MW (AC) Solar Plant at Delivery Point (metering point) shall be summarily rejected. The Bidder shall submit PVsyst report along with NEEGG.
- 3.14.5 The deration in NEEGG quoted for any year shall not be more than 1% of the quoted for the first year. If the Bidder anticipates any 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 Performance Guaranteed Generation. The NEEGG of consecutive year should not be more than the previous year's NEEGG. Bids not following these conditions shall be summarily rejected.
- 3.14.6 This NEEGG shall be used for the evaluation of the Bids as Appendix 6: Bid Evaluation Criteria (BEC).

--- End of Section ---

4. Submission of Bid

General Terms

4.1 General Terms

- 4.1.1 A Bidder is eligible to submit only one Bid for the Project. A Bidder shall not be entitled to submit another Bid either individually or in a Consortium, as the case may be.
- 4.1.2 Notwithstanding anything to the contrary contained in this RFP, the detailed terms specified in the draft Contract Agreement shall have overriding effect; provided, however, that any conditions or obligations imposed on the Bidder hereunder shall continue to have effect in addition to its obligations under the Contract Agreement.
- 4.1.3 The Bid should be furnished in the formats mentioned in the RFP document which shall be duly signed by the Bidder's authorized signatory, provided that the Financial Proposal will be submitted in separate envelop.
- 4.1.4 The Bidder shall submit a power of attorney as per the format at "Appendix 12: Format of Power of Attorney as Authorized Signatory" authorizing the signatory of the Bidder to commit to the Bid or as per their Company's format.
- 4.1.5 Any condition or qualification or any other stipulation contained in the Bid shall render the Bid liable to rejection as a non-responsive Bid. The complete Bid shall be without alterations, interlineations or erasures, except those to accord with instructions issued by the Owner, or as necessary to correct errors made by the Bidder, in which case such corrections shall be initialled by the person or persons signing the Bid.
- 4.1.6 The RFP documents and all attached documents are and shall remain the property of the Company and are transmitted to the Bidders solely for the purpose of preparation and the submission of a Bid in accordance herewith. Bidders are to treat all information as strictly confidential and shall not use it for any purpose other than for preparation and submission of their Bid. The Company will not return any Bid or any information provided along therewith.
- 4.1.7 The Bidder shall submit PF code number allotted by Regional PF Commissioner. Failure to do so is likely to result in the offer being rejected.



4.1.8 Bidder shall note that the Price Bid of only those Bidders shall be opened who are found technically qualified and responsive to GIPCL's Tender terms and conditions including but not limited to Scope of Works.

4.2 Format and Signing of Bid

4.2.1 The Bidder shall provide all the information sought under this RFP. The Owner will evaluate only those Bids that are received in the required formats and complete in all respects.

4.2.2 The Bid shall be typed or written in indelible ink and signed by the authorized signatory of the Bidder who shall also initial each page, in blue ink. All the alterations, omissions, additions or any other amendments made to the Bid shall be initialled by the person(s) signing the Bid.

4.3 Sealing and Marking of Bid

4.3.1 The Bid of the Bidder shall be contained in one (1) single "Main" Envelope.

4.3.2 The Main Envelope shall contain two (2) Envelopes as follows:

1. **"Original" Envelope;**
2. **"CD" Envelope.**

4.3.3 The "Original," Envelopes shall contain the following Envelopes:

- a. Cover-I: Signed Copy of the Tender Document(s)
- b. Cover-II: Enclosures of the Bid
- c. Cover-III: Proof of EMD; and Tender Fee
- d. Cover-IV: Financial Proposal unpriced and duly signed and stamped

4.3.4 The "CD" Envelope shall contain one (1) no. of CD containing the following folders with the same information submitted in the Original Envelope:

- a. Cover-I: Signed Copy of the Tender Document(s)
- b. Cover-II: Enclosures of the Bid
- c. Cover-III: Proof of EMD and Tender Fee

d. Cover-IV: Financial Proposal unpriced and duly signed and stamped

4.3.5 All original attested Tender Documents, Bid Enclosures, EMD and Tender Fee, and Financial Proposal (unpriced) shall be contained in the “Original” Envelope.

4.3.6 All soft/ scanned copies of the original attested Tender Documents, Bid Enclosures, EMD and Tender Fee shall be contained in the CD in an appropriately organized manner as in the physical copies, and enclosed in the “CD” Envelope.

4.3.7 IMPORTANT: THE COPY OF THE FINANCIAL BID SHALL NOT BE INCLUDED IN THE CDS.

4.3.8 Envelopes shall be clearly marked as “Original,” and “CD”.

4.3.9 The content of documents uploaded on eProcurement portal and hard copies submitted should be same and in case of any discrepancy all documents uploaded on eProcurement portal shall stay valid.

4.4 Enclosures of the Bid

4.4.1 Cover-I shall be duly marked as “Signed copy of the Tender Document(s)” and shall include the duly signed and sealed Tender Document including its annexure, appendices, attachments, amendments and any other documents as added or modified by GIPCL as per the provisions in this Tender.

4.4.2 The documents accompanying the Bid other than the attested Tender Document(s), and Proof of Tender Fee and EMD shall be placed in Cover-II and marked as “Enclosures of the Bid”. These documents shall include:

- a. The Covering Letter as per the format prescribed in Appendix 1: Format for Covering Letter.
- b. Details of the Bidder as per format prescribed in Appendix 2: Details of Bidder. Attested copy of Service Tax Registration Certificate of Bidder.
- c. Attested copy of PAN Card for Bidder.
- d. Attested Certificate of Commencement of Business issued by the Registrar of Companies for the Bidder.



- e. Attested copy of Provident Fund Code of Bidder.
- f. Details of similar technical experience of the Bidder as per format prescribed in Appendix 3: Format of Details of Similar Technical Experience.
- g. List of proposed PV technologies as per format prescribed in Annexure 4: Format of Disclosure of PV Technology
- h. Project execution plan as mentioned in Appendix5: Format for Project Execution Plan.
- i. Submission of Technical Document as per format prescribed in Annexure 7
- j. Details of qualified technical staff as per format prescribed in Appendix 8: Details of qualified technical staff
- k. Declaration of Compliance as per format prescribed in Appendix 9.
- l. No Deviation Certificate as per format prescribed in Appendix 10.
- m. Declaration of Bidder's relation to Directors of the Company as per format prescribed in Appendix 11.
- n. Format of Power of Attorney as Authorized Signatory as per format prescribed in Appendix 12
- o. Format of Summary of audited financial statements as per format prescribed in Appendix 13.
- p. (If applicable) Authorization of use of financial capability by Parent as per format prescribed in Appendix 14: Format of Authorization by Parent Company with the necessary financial statements and summary required from the Bidder.
- q. Format for Undertaking (Clause No. 3.2.4) as per format prescribed in Appendix 21.
- r. Project Operation & Maintenance (O&M) Schedule with resource planning in the form of Gantt/ Pert Charts
- s. Technical specifications and standard warranty document of PV modules.



- t. Design, specifications and document of Solar Tracking solutions (if proposed by Bidder).
 - u. Specifications / Drawings / Designs and datasheets for all electrical work / components as prescribed in Clause No. 5
 - v. Technical specifications and warranty document of Inverters
 - w. Transformers, associated switchgear and others: Bidder shall furnish in detail its warranties/guarantees for these items.
- 4.4.3 Cover-III shall be duly marked as “copy of Proof of EMD and Tender Fee” and shall contain the copy of proof of Tender Fee and EMD.
- 4.4.4 Cover-IV shall be duly marked as “Financial Proposal unpriced duly signed and stamped” and shall contain the Financial Proposal (unpriced duly signed and stamped) as per the format prescribed in Appendix 15: Format of Financial Proposal.
- 4.4.5 All Bid documents shall be placed in hard binding and the pages shall be numbered serially. Each page thereof shall be initialled in blue ink by the authorized signatory.
- 4.4.6 All envelopes in the Bid Documents shall be sealed. The outer envelope shall clearly bear the following identification:

Outer Envelope

“Tender Bid Document’ for setting up of 75 MW (AC) Solar Photovoltaic Grid-Connected Power Plant near Surat Lignite Power Plant of GIPCL, Dist. Surat, Gujarat on EPC basis”.

Cover-I shall bear the following identification:

“Cover-I: Signed RFP Document for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat, Gujarat”.

Cover -II shall bear the following identification:

“Cover-II: Enclosures of the Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat, Gujarat”.

Cover -III shall bear the following identification:

“Cover-III: EMD and Tender fees of the Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat, Gujarat”.

Cover -IV shall bear the following identification:

“Cover-IV: Financial Proposal (unpriced but duly signed and stamped) for the Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat , Gujarat”.

4.4.7 Each of the envelopes shall clearly indicate the name and address of the Bidder. In addition, the Bid Due Date should be indicated on the right hand top corner of each envelope.

4.4.8 Each of the envelopes shall be addressed to:

ATTN:

Shri S.N. Purohit

CHIEF GENERAL MANAGER (RE & BO)

Gujarat Industries Power Company Limited

PO: Ranoli-391350,

Dist.: Vadodara, Gujarat, India

Tel.:+91-265-2230185/2232768/2213

Fax: +91-265-2230029

Email: solar@gipcl.com, snpurohit@gipcl.com



4.4.9 If the envelopes are not sealed and marked as instructed above, the Company assumes no responsibility for the misplacement or premature opening of the contents of the Bid submitted.

4.4.10 Bids submitted by fax, telex, telegram, courier or e-mail shall not be entertained and shall be rejected.

4.5 Bid Due Date

4.5.1 Bids should be submitted before the Deadline for Submission of Bid as specified in NIT.

4.5.2 GIPCL may, in its sole discretion, extend the Bid due date by issuing an Amendment/ Addendum in accordance with Clause No. 3.6 uniformly for all Bidders.

4.6 Late Bids

4.6.1 Bids received by the Owner after the specified time on the bid due date shall not be eligible for consideration and shall be summarily rejected. In case of the unscheduled holiday being declared on the prescribed closing/opening day of the Bid, the next working day shall be treated as the scheduled prescribed day of closing/opening of the Bid.

4.7 Confidentiality

4.7.1 Information relating to the examination, clarification, evaluation and recommendation for the Bidders shall not be disclosed to any person who is not officially concerned with the process or is not a retained professional advisor advising the Company in relation to or matters arising out of, or concerning the bidding process. The Company will treat all information, submitted as part of the Bid, in confidence and will require all those who have access to such material to treat the same in confidence. The Company may not divulge any such information unless it is directed to do so by any statutory entity that has the power under law to require its disclosure or is to enforce or assert any right or privilege of the statutory entity and/ or the Company.

4.8 Correspondence with the Bidder

4.8.1 The Owner shall not entertain any correspondence with any Bidder in relation to acceptance or rejection of any Bid.

4.9 Bid Opening and Evaluation

4.9.1 The Owner shall open, examine and evaluate the Bids in accordance with the provisions set out in this RFP document.

4.9.2 To facilitate evaluation of Bids, the Owner may, at its sole discretion, seek clarifications in writing from any Bidder regarding its Bid.

4.9.3 After the receipt of Bids the Owner may at its discretion send a team of engineers if necessary to inspect the engineering facilities, to ensure suitability and satisfactory working conditions at the Bidder's works/yards(s) and equipment listed to be used by the Bidder for the work. The Bidder shall ensure that the aforesaid team shall at all the times have access to visit and inspect works, equipment etc.

4.10 Tests of Responsiveness

4.10.1 Prior to evaluation of Bids, the Owner shall determine whether each Bid is responsive to the requirements of the RFP. A Bid shall be considered responsive only if:

- i. The minimum Performance Guaranteed of the Power Plant for one year is provided by the Bidder.
- ii. it is received in the manner prescribed in this RFP
- iii. it is accompanied by the requisite Tender Fee and EMD;
- iv. it is received with all the Enclosures of the Bid as prescribed in the Clause 4.4
- v. its Enclosures are received as per the formats specified in Appendices as well as the Tender;
- vi. it contains all the information (complete in all respects) as requested in this Tender (in the same formats as specified);
- vii. it complies with all the terms, conditions and provisions specified in this Tender; and
- viii. it does not contain any conditions or deviations

4.10.2 The Owner reserves the right to reject any Bid which is non-responsive and no request for alteration, modification, substitution or withdrawal shall be entertained by the Owner in respect of such Bid.

4.11 Modification and Withdrawal of Bids

4.11.1 In case any clarifications are sought by the Owner after opening of Bids then the replies of the Bidder should be restricted to the clarifications sought. Any Bidder who modifies

its Bid (including a modification which has the effect of altering the value of its Financial Proposal) after opening of Bid without specific reference by the Company, shall render the Bid liable to be rejected without notice and without further reference to the Bidder and its EMD shall be forfeited.

4.11.2 No Bid may be withdrawn in the interval between the bid due date and the expiration of the validity period of the Bid. Withdrawal or unsolicited modification of a Bid during this interval shall result in the Bidder's forfeiture of its Bid Security.

4.12 Evaluation of Bid and selection of Bidder

4.12.1 GIPCL 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.

4.12.2 Prior to the detailed evaluation, GIPCL will determine the substantial responsiveness of each Bid. A substantially 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. GIPCL's determination of a Bid's responsiveness is to be based on the contents of the Bid itself without recourse to extrinsic evidence.

4.12.3 If the Bid is not substantially responsive, it will be rejected by GIPCL and may not subsequently be made responsive by the Bidder by correction of the nonconformity.

4.12.4 GIPCL will evaluate and compare Bids which have been determined to be substantially responsive.

4.12.5 Void .

4.12.6 Following factors shall be required for evaluation of Bid:

- a. The Evaluated Bid Value (EBV) shall be calculated separately for both options of power evacuation using the following parameters:
 - i. Engineering Procurement Commissioning (EPC) Contract Price;

- ii. Net Present Value (NPV) of O&M Price of three (3) years;
- iii. Net Electrical Energy Generation Guarantee; and

(i) Evaluated Bid Value (EBV) =

$$\frac{[(\text{EPC Contract Price}) + (\text{NPV of each year O\&M Contract Price of 03 years of})]}{\Sigma \text{NEEGG of 03 years}}$$

- b. The Bid with the Lowest Evaluated Bid Value shall be considered as L-1 and the Successful Bidder. The Bid with next highest value shall be considered as L-2 and so on for more understanding please refer Appendix 6. An example has also been done for Bidder's comprehension.
- c. Two EBV for option-1 and option -2 of Power evacuation will be derived and bidder has to quote in both the price schedule.

4.12.7 In no case, a Bidder shall have the right to claim to be the Successful Bidder for its Bid.

4.12.8 Evaluation of both Techno-Commercial (un-priced) bids and priced bids shall be done separately.

4.12.9 Price Bids of only techno-commercial acceptable bids shall be considered for further evaluation.

4.12.10 Bid Evaluation shall be done as per the details given in Appendix-6.

4.12.11 For Bid Evaluation purpose, O&M period will be considered as 3 years.

4.12.12 Lowest Five (5) eligible bidders or 50% out of total eligible Bidders (rounded to the next higher whole number), whichever is higher shall be invited for participation in e-Reverse Auction.

4.12.13 Decrement value and duration for the e-Reverse Auction shall be informed to the qualified bidders before start of e-Reverse Auction. The L1 EBV shall be put up for starting e-Reverse Auction. e-Reverse auction shall be for reducing the EBV and the bidders have to reduce their EBV in decrement of value as decided before start of e-Reverse Auction. e- Reverse auction for both the projects (options) shall be carried out.

4.12.14 The reduction offered by the Bidder during e-Reverse Auction Process on the EBV shall be considered for as an equivalent reduction in Total EPC Contract Price only, based on formula of EBV indicated in Appendix-6. Accordingly, final EPC Contract Price will be arrived for all contractual purposes based Quoted O&M cost for 3 years and NEEGG for 3 years shall remain fixed and no change will be allowed in these parameters during e-Reverse Auction.

4.12.15 After e-Reverse Auction process, L1 bidder(s) for the 75 MW (AC) Solar Project shall be decided on lowest EBV. The L1 bidder(s) after e-Reverse Auction shall have to submit break-up in line with their quoted price bid within three (3) days. Only one work order shall be issued considering any one option of power evacuation.

4.13 Contacts during Bid Evaluation

4.13.1 Bids shall be deemed to be under consideration immediately after they are opened and until such time the Owner makes official intimation of award/ rejection to the Bidders. While the Bids are under consideration, Bidders and/ or their representatives or other interested parties are advised to refrain from contacting by any means, the Owner and/ or their employees/ representatives on matters related to the Bids under consideration.

4.14 Employment of Officials/ Ex-Official of the Owner

4.14.1 Bidders are advised not to employ serving the Owner. It is also advised not to employ ex-personnel of the Owner within the initial two years period after their retirement/ resignation/severance from the service without specific permission of the Owner. The Owner may decide not to deal with such firm(s) who fails to comply with the above advice.

4.15 Declaration on Bidder's Relation to Directors

4.15.1 The Bidders are required to certify in prescribed format Appendix 9: Declaration of Compliance, whether he/they is/are related to any of the Directors/Senior Personnel of the Company in any of the ways mentioned in the Certificate. It is clarified that any such affirmative certificate shall not, by itself, prejudice consideration of the Bid. This certificate must accompany the Bid.

4.16 Letter of Intent (“LOI”) and Notification to Proceed

4.16.1 After selection of the Successful Bidder, a Letter of Intent (the “LoI”) shall be issued, in duplicate, to the Successful Bidder. The Successful Bidder shall not be entitled to seek any deviation from the Contract, as may have been amended by GIPCL prior to the bid submission date.

4.16.2 On issue of the LoI by the Company, Authorised representative of the Successful Bidder shall sign the Contract Agreement within 30 (thirty) days and submit the Bank Guarantee within the stipulated time.

4.17 Performance Guarantee

4.17.1 Security Deposit cum Performance Bank Guarantee (SD/PBG) as per the format given in Appendix 18 (b): Format of Bank Guarantee for Security Deposit/ Performance Bank Guarantee shall be furnished in favour of Gujarat Industries Power Company Limited. The Successful Bidder shall submit Security Deposit cum Performance Bank Guarantee of 10% of the EPC Contract Price, within two weeks after issue of date of LOI, initially validity period of PBG should be for a total period up to thirty-one (31) months from the date of LOI. However, in case of delay in demonstration of the PG test, the same will have to be extended upto 3 months beyond the due date for completion of PG test. The period for Performance Guarantee Test shall begin from the date mentioned in NIT of this Tender and shall continue till next one (1) year. SD/PBG shall be returned only after successful Performance Guarantee Test/ Final Acceptance Test. No interest is payable on PBG amount.

4.17.2 The bank guarantee by the Contractor will be given from bank specified in Appendix 17: List of Banks (for Bank Guarantee) only. BG of any other Bank will not be treated as valid BG.

4.17.3 The PBGs shall be liable to be encashed wholly or partly at the sole discretion of the Owner, 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 Owner. In case of premature termination of the contract, the PBG will be encashed and the Owner will be at liberty to recover the loss suffered by it from the Contractor.

4.17.4 The Owner is empowered to recover from the PBG through invocation of PBG for any sum due and for any other sum that may be fixed by the Owner 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 guarantee obligations.

4.18 Fraudulent Practices

4.18.1 The Bidders may please note that the Owner shall not entertain any correspondence or queries on the status of the Bids received against this RFP. Bidders are advised not to depute any of their personnel or agents to visit the Owner's office for making such inquiries.

4.18.2 Any effort by a Bidder to influence the Owner on the Bid evaluation, Bid comparison or Contract award decision may result in the rejection of the Bidder's Bid.

--- End of Section ---

5. Scope of Work

5.1 GENERAL SCOPE OF WORK

The Scope of the Work includes the development of Solar Photovoltaic Grid-Connected Power Plant of 75 MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat, Gujarat along with associated power evacuation equipments on EPC basis. The Work shall be executed in conformity with the relevant applicable latest standards, codes, rules/ordinances & regulations. The overall design & engineering of the plant shall be based on latest available technology and optimal usage of space to minimize ohmic losses and maximize efficiency.

AC capacity of the plant shall be 75 MW(AC) for Solar PV project with maximum DC installation capacity under Standard Test Conditions (STC) as per IEC61215 and IEC:61730. The Contractor shall comply that the maximum AC capacity (i.e. 75 MW(AC) upto plus 5% (i.e. 78.75 MW).

Power Evacuation Options

Option- I

Bidder has to consider power evacuation through overhead/ Underground/ combination of overhead & underground 66 KV Transmission line of appropriate size from switchyard(s) of solar plant(s) to 66 kV Mosali GETCO-S/S passing through the specified Transmission corridor/s indicated by GIPCL.

OR

Option- II

Evacuation of Power from 220KV switchyard of Surat Lignite Power Plant of GIPCL through. Dedicated 33kV Transmission line (Underground Cable/ overhead transmission line/ combination of both) from solar plants to 220kV switchyard of Surat Lignite Power Plant of GIPCL.

Further Bidders shall explore possibility to design single Switchyard between North Plot and South Plot subject to technical and site feasibility and best commercial proposal. However, termination at GETCO end shall be in two separate evacuation bays for 75 MW (AC) project. Evacuation cable and transmission lines shall be GETCO approved and as per current carrying capacity and voltage drop selection criteria.

The Contractor shall comply that the maximum AC capacity shall not exceed 75 MW (AC) . The general scope of work for 75 MW (AC) solar PV power plant near Surat Lignite Power Plant of GIPCL, shall involves Design, Engineering, Procurement & Supply and Construction (EPC) of the grid-connected solar photovoltaic power plant, commissioning and evacuation of power into the

GETCO's 66 KV mosali substation through construction, erection, testing and commissioning of 66 KV Underground cable/above ground transmission line as per GETCO guidelines OR evacuation of Power into the GETCO grid through 220kV Switchyard of Surat Lignite Power plant through construction, erection, testing and commissioning of 33/66 KV Underground cable/above ground transmission line as per GETCO guidelines corresponding to the guaranteed plant performance in the form of guaranteed energy output including operation and maintenance for three years, Supply Laying/Erection Testing & Commissioning of 33/66/220 kV Power evacuation line/s form 75 MW (AC) Solar Plant Switchyard to 66 kV GETCO S/S at Village Mosali OR up to 220kV Switchyard of Surat Lignite Power Plant of GIPCL shall be considered in the scope of work. All the transmission line related scope of work shall be as per as per GETCO approved and as per current carrying capacity and voltage drop selection criteria, Comprehensive AMC of critical component/equipment.

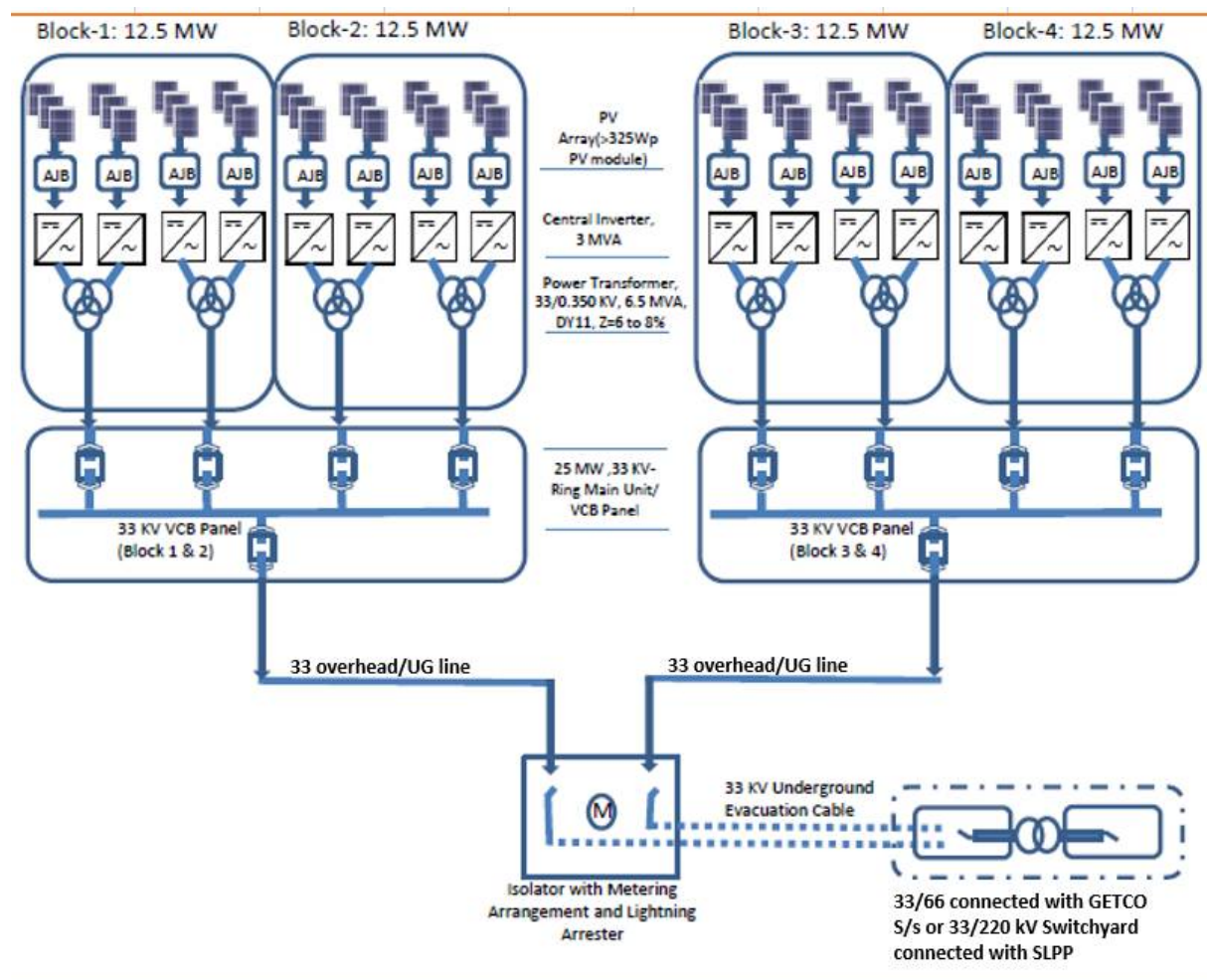


Figure 5-1 : Indicative Schematic Single Line Diagram For 75 MW (AC) Project

5.1.1 Evacuation of Power & Metering Point:



For the purpose of this project, the evacuation voltage shall be at 66 kV AC (three phase) wherein evacuating point cum metering point for 75MW (AC) Solar Plant shall be installed at 66 kV side of 66 kV Mosali Sub-Station of GETCO including construction of bay along with necessary equipments at GETCO premises. Also, one more metering system is to be installed at 66 kV side of 66/33 kV Switchyard of 75 MW (AC) Solar Plant developed by Bidder. Scope of work shall also include procurement, supply, erection/laying, Testing and commissioning of 66 kV Under Ground cable work/ Overhead Transmission/ Combination of both Power evacuation lines from 75 MW(AC) solar plant substation to 66 kV GETCO substation at Village Mosali. ABT Meter to measure net power evacuation shall be installed as mentioned above and as per the CEA/GETCO guidelines. Metering point shall be at 66 kV side of 66 kV Sub-Station of GETCO at Vilaage Mosali.

OR

For the purpose of this project, the evacuation voltage shall be at 220 kV AC (three phase) wherein evacuating point cum metering point for 75MW (AC) Solar Plant shall be installed at 220 kV side of 220 kV Switchyard of Surat Lignite Power plant of GIPCL at Village: Nani Naroli, Dist: Surat including construction of bay along with necessary equipments at 220Kv Switchyard premise. Also, one more metering system is to be installed at 66/33 kV side of 66/33 kV Switchyard of 75 MW (AC) Solar Plant developed by Bidder. Scope of work shall also include procurement, supply, erection/laying, Testing and commissioning of 66/33 kV Underground cable work/Overhead Transmission Power evacuation lines/ underground cable from 75 MW(AC) solar plant substation to 220 kV Switchyard of Surat Lignite Power plant of GIPCL, Power transformer along with other equipments i.e. LA, Wave/ Line Trap, CT, PT, isolators, 220KV breaker of Bay at 220kV switchyard. ABT Meter to measure net power evacuation shall be installed as mentioned above. Metering point shall be at 220 kV side of Switchyard of Surat Lignite Power plant of GIPCL at Village: Nani Naroli, Dist: Surat.

Tariff Metering system shall be as per approval of GETCO/ STU/ DISCOM. If multi core instrument transformers (CT & PT) are allowed (subject to approval of GETCO/ STU/ DISCOM), secondary terminals box with sealing facility for tariff metering core shall be separate i.e. CT & PT shall be with two secondary terminal boxes one for tariff metering core and other for remaining cores. **Else dedicated CT & PT (secondary terminal box with sealing facility) shall be supplied and installed for tariff metering purpose.** Testing of



all Meters and instrument transformers related to tariff metering at laboratory approved by GETCO/ STU/ DISCOM along with charges for testing shall be in the scope of the bidder.

Bidder has to comply with all the latest statutory requirements, state regulations, SERC grid connectivity regulations, CEA grid connectivity standards, technical standards, plant and equipment safety standards, MNRE guidelines/OM/Advisory/Clarifications. The solar PV plant should fully comply with the Grid Connectivity Regulation as per Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulation, 2007 with all latest amendments including Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019 and CEA (technical standards for construction of Electrical plants and electric Lines) Regulation 2010 and amendment thereof. Supply of hot standby redundant power plant controllers (PPC) is in the scope of the Bidder. Detailed control logic in the PPC shall be finalized during detailed engineering stage and same shall be in line with the above regulation requirements. The solar plant SCADA and PPC networks shall be suitably designed, so that PPC shall directly and independently be able to control the individual solar inverter. Suitable PQ meters (class-A type) at plant final output (within Bidder's scope), for measurement of required electrical parameters (active power, reactive power, power factor, voltage, current, frequency, etc.) shall be provided for this purpose. Selected PQ meters shall be able to measure grid frequency with minimum two digit after decimal point.

Bidder shall provide all data and applicable study/simulation reports as per 'Procedure for Integration of solar plant those are regional entities' for submission to Load Dispatch Centre for first time charging clearances (if required by regulatory/statutory body).

All equipment, materials and services whether explicitly stated in Technical Specifications or otherwise and that are necessary for the successful commissioning of Solar Plant as per latest statutory regulations/procedures issued by bodies like CERC, CEA, SLDC/NLDC, ISTS, MNRE, other Ministry etc. shall be deemed to be included in the scope of work of the Contractor.

POC: Point of connection shall be decided based on requirement with concerned authorities i.e. GETCO/STU/DISCOM/GUVNL/SECI/MNRE etc.

1. All below mentioned process shall be completed at least before 06 months of First Time Charges (FTC) activities (or earlier as per the guidelines to complete the charging process on time).



2. Equivalent SLD up to POC
3. ABT/SEM Meters Dummy Data and establishing its compatibility with MDP software of RLDC/NLDC/POSOCO etc.
4. ABT Meter time drift report submission for FTC.
5. Detailed and aggregated simulation model (PSS and PSCAD) and report up to POC (Models should be suitable for an integration time step between 1ms and 20ms, and suitable for operation up-to 600s)
6. PQ capability curve at POC and reactive power study.
7. Power Plant Controller Generic Modeling with PSCAD.
8. Steady state analysis Load flow (Base case and worst case), short circuit, etc.
9. Transformer and line modelling and loading and block diagram of electrical model.
10. Dynamic and transient studies. (Voltage and frequency response tests)
11. EMT Model of the Plant and Benchmarking Through Dynamic Study
12. Evaluation of fault levels and maximum short circuit level at each bus.
13. Reticulating system / SLD's as per RLDC / CTIL practices.
14. Registration to the RLDC / POSOCO / NLDC portal for first time charging (FTC) including its fees.
15. Compliance in respect to power quality, DC content, Harmonics etc.
16. Required system data of Grid shall be obtained / coordinated by EPC contractor from concerned authorities.
17. Compliance of List of IEC-104 data required by concerned competent authorities (RLDC and or NLDC and or SLDC and or ALDC or POSOCO) and its point to point testing.
18. Submission and approval of Con-4,5,6 to concerned authorities.
19. Any other requirements to get approval of FTC.
20. Above list is indicative and not limited to.

5.1.2 Operation and Maintenance (O&M):

The scope of work includes Operation and Maintenance (O&M) of the plant [75 MW (AC)] for Three (03) years, wherein the plant shall generate at least equivalent to the guaranteed Performance of the plant. The Bidder shall submit in the Bid a comprehensive project execution schedule as well as Operation and Maintenance (O&M) schedule with resource planning in the form of Gantt chart and shall be liable for abiding by the schedule. It is the responsibility of the Contractor to perform the necessary maintenance/ timely replacement of all Civil /Mechanical or Electrical components of the project during this O&M period such that the guaranteed performance of the plant is not compromised. Any damage to CIVIL/ ELECTRICAL/ MECHANICAL components of the plant is to be reworked/ replaced/ supplied without any extra cost and time by the Contractor during complete O&M period. The Operation and Maintenance shall be comprehensive. The maintenance service provided

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

- a. **Preventive / Routine Maintenance:** This shall be done by the Contractor regularly and shall include activities such as cleaning and checking the health of the Plant, cleaning of module surface, tightening of all electrical connections, and any other activity that may be required for proper functioning of the Plant as a whole. Necessary maintenance activities, preventive and routine for Transformers and associated switchgears also shall be included.
- b. **Breakdown/ Corrective Maintenance:** Whenever a fault has occurred, the Contractor has to attend to rectify the fault, the fault must be rectified within 48 hrs time from the time of occurrence of fault failing which the Contractor will be penalized as per terms and conditions of this Tender.

The date of Comprehensive Operation and Maintenance Contract period of the Plant shall begin on the date as defined in the NIT of this Tender. Detailed scope of comprehensive Operation & Maintenance has been described in Chapter 5 and Annexure-7 of this document. However, operation of the Power Plant means operation of system as per bidding schedule and workmanship in order to keep the project trouble free covering the guarantee period.

5.1.3 Tracking Structures:

The Owner encourages Bidders to employ proven and reliable fix or any other tracking system system, however the Bidder should note that total land available is approximately 1.8 Ha /MW(AC). The Bidder shall submit in the Bid, the details / specifications / designs / guarantees and warranties / and any other claims on performance / output of the solar tracking solutions in the Bid document.

5.1.4 Electrical Work:

Consisting of installation of solar PV modules, junction boxes, grid-tied inverters, inverter duty transformers, auxillary transformer, meters, control and relay panels, EHV, LT & HT



switchgear, 33//66/220 kV switchyard for evacuation., 33/66 kV UG/ Overhead transmission lines work up to 66 kV GETCO substation at Village Mosali or up to 220kV switchyard of Surat Lignite Power Plant of GIPCL, interconnection through wires, cables, bus bars, etc.; plant lighting system, automatic weather monitoring station (AWMS), SCADA and remote web-based communication & monitoring hardware, software etc.; plant and human safety and protection equipment including danger signs etc. UPS system shall be provided at Main Control room and each Inverter room. Sump pumps shall be provided in MCR (s) & Switchyard (s). Communication system with dual redundancy i.e. OPGW/OFC and/or PLCC with all associated equipments like CVT, Wave trap, along with necessary terminal equipment as per requirement of GETCO/STU shall be provided. **System study for entire electrical plant design shall be in Bidder's scope.** Anything is not mentioned in the list but still required to finish the EPC contract of Solar Plant capacity to be considered for the BID.

5.1.5 Civil and Other Non-Electrical Work:

- i) **Module Mounting Structures (MMS):** The Contractor shall design, fabricate, supply and install module mounting structures with all required accessories like clamps, nuts, bolts, cable ties etc., The structures can be of fixed/ seasonal tracker or any other tracking are accepted.
- ii) **Foundations:** The Contractor shall design and construct appropriate RCC civil foundations for MMS, prefabricated HOT DIP GI Coated structures / RCC frame structure, Main control room, Inverter room, transformers, switchyard equipment, feeder bay, fencing foundation, security/watchman cabin foundation and all other misc civil foundation shall be RCC foundation/RCC cast in situ bored pile foundation as per the geotechnical soil investigation report & site requirement. Grade of reinforced cement concrete shall be minimum M25 grade and designed with exposure condition as "Moderate" Environmental weather condition using minimum 400 Kg of ordinary Portland cement (55 grade) as per IS 456 irrespective of Grade of concrete. Contractor has to submit mix design report (Minimum 400 kgs cement) to client for reinforced cement concrete along with admixture for approval before execution. Contractor shall submit batch report of each concrete batch or engage concrete mixer equipment (batching plant) having facility of batch report of each concrete batch. All necessary test related to materials of concrete mix like cement, sand, steel, aggregates etc shall be carried out regularly as per relevant IS code. Test related to concrete like compressive strength, workability etc shall be carried out as per relevant IS Codes. Contractor shall carry out any special treatment below foundation, below RCC cable trenches, below RCC floor



slab/plinth as required for strengthening sub-base of foundation base on soil characteristics.

Backfilling after concreting of foundation/trenches shall be carry out using Muroom/river sand or bed ash in the trenches for switchyard, Tranformer foundations and in all types of foundations of rooms and plinth . Bidder shall carry out Pull out, Lateral and compression test if bidder has opted for cast in site pile foundation/pre cast pile foundation/Driven pile foundation. Numbers of the test will be directed by GIPCL (Owner). Numbers of Routine test is also carried as per relevant IS code. If the Bidder is opting for Ramming then necessary test is to be carried out for ensuring it's stability against uplift force, Lateral force and compression force. For pile foundation, pile integrity test shall be carried out by contractor as per directive of OWNER by engaing third party at their cost.

iii) **Prefabricated Structures:** The following prefabricated /RCC structures are to be planned and constructed by the Contractor for the 75 MW (AC) project near Surat Lignite Power Plant of GIPCL:

- Elevated Prefabricated Inverter rooms with FFL + 0.6 m above FGL/High tide level whichever higher as per design
- Elevated RCC frame strucutre with Pre-fabricated roof for Control room cum Conference room with design to be kept @ FFL + 0.6 m above FGL/High tide level whichever higher including, Store, Battery, Scada room, Toilet and Pantry -01 Nos.
- Elevated Prefabricated Watchman's cabin (At Main Gate) of each loaction with FFL +0.6 m above /High tide level whichever higher as per design - 01 Nos.
- Elevated Security Cabins at 06 nos at suitable location with FFL +0.6 m above FGL/High tide level whichever higher as per design - 06 Nos.
- Elevated Watch tower at 4 corners of the each plant locations at 03 mtr above FGL.

iv) **Storm Water Drainage System:**The contractor shall have to design the Discharge capacity of individual storm water drain considering catchment area of the individual drain and the storm water from upstream side or from near by natural drain. For easy evacuation of storm water contractor has to arrange for cross drainage works at all road junctions. The Contractor shall provide storm water drainage system on one side of peripheral road. Hume Pipe of 450mm dia(NP3) is to be provided at various locations on central road for easy passage of



water. Storm water drain should be paved by flyash bricks lining in cement mortar 1:4 & plaster on exposed surface of 1:3 with Manhole chamber and R.C.C. cover. The Contractor shall provide storm water drainage system for entire plant.

- v) **Solar PV Module Cleaning System:** Cleaning frequency shall be decided by the Bidder to meet the guaranteed generation but the cleaning cycle shall not exceed 15 days. For this, the Contractor shall construct and operate 7.5 lacs liter (i.e. 3 x 2.5 lacs liter, Location of the underground tank shall be finalized as per instruction of GIPCL engineer) underground, on ground or Elevated RCC with GI/Powder Coated/Fibre/Coated sheet cover on top with necessary supporting steel structure. FRP or HDPE (3 to 4 layers) water storage tank are also accepted. Contractor has to make his own arrangement for connection and controlling device for getting the water supply from main source of water. Alternatively if the clean water source not available For module cleaning, the contractor can provide new tanker with pump; water jet and hose pipe or establish a GI/UPVC pipeline network with valves rested on either concrete foundation or underground.. Further for total plant capacity of both plant site bidder shall arrange wet cleaning via pipe line network.
- vi) **Chain-Link Fencing :** The Contractor shall provide PVC coated chain-link fencing of the entire plant boundary for the plant sites. Clause No.5.2.16 and detailed drawing (Annexure-A4). Foundation shall be carried out as per geotechnical soil investigation report for design for fencing pole.
- vii) **Approach / Internal Roads and Pathways:** The Contractor shall provide internal roads network consist of Central main approach road and periphery roads for 75 MW (AC) Solar Plant sites. Main approach road shall be of bituminous type and shall be extended up from Main gate to control room to Switchyard and all Inverter rooms. All peripheral roads shall be of WBM type. Top level of the Bituminous road shall be 300mm and WBM road shall be 100 mm high then High tide level/Highest accumulated rainy water level.
- viii) **Cable Trenches:** Looking to the site conditions near Surat Lignite Power Plant of GIPCL, considering soil and environment condition either RCC cable trench of suitable size cable trench shall be provided for prefabricated local control rooms and main control room. , Earthen excavated cable trench with alternate layers of sand and brick of class C or either precast blocks approved by GETCO is allowed as per relevant IS from PV arrays to inverter room to control room to switchyard shall be provided by the Contractor.



- ix) **Main Gate:** The Contractor shall provide main gate of Hot Dip G I coated structural steel and RCC material of appropriate design for 75 MW(AC) Solar plant sites (For both location separate Main gates shall be provided). Main gate shall be provided with the name of Owner using 3 mm thick Aluminium composite panel (ACP sheet) including printing on 3M or LG Vinyl media with eco-solvent printing with lamination and sticking same on the sheet as directed by Owner. Size/Pattern of the letter shall be as per direction of Owner. Also, necessary arrangement has to be made by Contractor to erect the main gate on RCC structure with sufficient G I hold fast.
- x) **Site levelling:** The Contractor shall level the site, as required, so as to compact the plant in minimum possible area and also minimize shading losses because of solar PV module structures. Removal of debris and bush-cutting is mandatory if anything available before start of civil works. Bidder has to visit the site for ensuring such conditions., Levelling & area grading of the site is to be done if required for smooth drainage of surface water naturally to avoid the accumulation of rainy water / tidal water in plant area. Levelling of the site is to be done by EPC contractor if required before starting of Operation and Maintenance period.
- 5.1.6 **Communication:** The Contractor shall provide complete plant SCADA (Software based) with SCADA server having string junction box level monitoring capabilities over remote server. Contractor shall lay the cable in appropriate cable trench, connect with suitable connectors and terminate to the SCADA server inside control room. The Successful EPC Contractor shall also provide necessary internet connection through GPRS enabled modem along with LAN connectivity for data communication over remote server and shall bear the cost of the same during the Contract period including O&M. The Contractor shall provide 4nos. of Web Client License for remote monitoring. The Contractor shall provide necessary provision of RTU for communication with SLDC/ ALDC, necessary equipment arrangement shall be done at plant level and ALDC/SLDC level. The Contractor shall submit the below mentioned Technical Data Sheet for String RTU, TCP String, Central RTU in the prescribed format.

Type Code

Power Entry Characteristics

AC input voltage range ($V_{ac, min}$ $V_{ac, max}$)

Nominal AC input voltage ($V_{ac,n}$)

Rated frequency (f_r)

DC Input Voltage Range ($V_{dc,min} \cdot V_{dc,max}$)

Nominal DC input voltage ($V_{dc,n}$)

RS485 Section

Serial interface type

Baud rate

Protocol

Number of devices

Line biasing resistor (wherever necessary)

Termination resistor

RS485 MODBUS section

Serial interface type

Baud rate

Protocol

Number of devices

Line biasing resistor (wherever necessary)

Termination resistor

Physical and Environmental

Environmental protection rating

Ambien temperature range

Relative humidity

Compliance

Isolation

Marking

Safety and EMC standard

Essential list of I/O and equipment is given herewith, but scope is not limited to the Essential List, contractor is fully responsible to provide complete SCADA System which can be extensible / communicable with add additional / future solar plant.



| Sr. | Equipment to be monitored | Data to Be Monitor (Real Time) | Type of IO |
|-----|--|--|---|
| 1 | String Monitoring / Array Monitoring (Optional) | Each PV string needs to be monitored (Optional) | Through Communication with SJB PLC/Card |
| 2 | String Junction Box / Array Junction Box (SJB = AJB) | SJB Bus Voltage and Current | Through Communication with SJB PLC/Card |
| 3 | Inverter | All Electrical Parameters of Inverter along with Scanning, Records & Error communication | Through Communication with SJB PLC/Card |
| 4 | Inverter Transformer | Oil and Winding Temp Monitoring | Analog Input |
| 5 | HV (11/33 kV) RMU / VCB | ON/OFF and Trip position of Each RMU / VCB and Energy Meter RS-485 communication | DI and Communication |
| 6 | 220/66/33 KV Switchyard | All Equipment details including Power Transformer, Breakers, C&R Panels, Isolators, Earth Break Switches, Metering & Protection Devices etc. | DI and Communication |
| 7 | Weather Monitoring Station | Two no. of Class II Pyranometer (According to ISO 9060: Secondary Standard) (one for GHI, one at PV plane collector angle), Two numbers of contact type temperature sensors one at module front and the other at backside of the module. Ambient temperature sensor, Wind velocity and speed sensor. | Through Communication |
| 8 | Aux. Equipments | Aux. Transformers, UPS, NIFPS, Fire Alarm Panel, CCTV, Water | AI / DI / Communication for Information / Records / Logging |



| | | | |
|---|----------------------|--|--------------------------------------|
| | | & Utility Pumps & Panels, Street Lights | |
| 9 | Main and Check Meter | All electrical parameters recorded by energy meter | Through RS-485/MODDBUS communication |

5.1.7 Plant Safety Equipment:

The Contractor shall provide appropriate numbers of foam type fire extinguishers / CO₂ extinguishers, sand buckets and transformer discharge rod at Inverter Rooms, Control Room, Security Cabin and Switchyard/Substation. Further, all high voltage places to be provided as per IS with danger sign boards with appropriate size and material to last for 25 years.

5.1.8 Statutory Requirements:

All construction, operation and maintenance procedures shall be carried out through appropriate relevant standards, regulations laid by GUVNL/GETCO / DGVCL / GEDA / GIPCL/ GoI / MNRE and / or any other agency as and when applicable. Further, this shall comply with the applicable labor laws. The Bidder shall make himself aware of such requirements and shall not solely depend on the Company to avail full information.

- All other approval, as necessary for setting up of a solar power plant including CEIG, connectivity, construction power, power evacuation, GEDA, GETCO, GPCB (at present GPCB Clearance is not Applicable) etc. as per the suggested guidelines.
- CT, PT and Metering system testing at ERDA or other lab as per GETCO requirements.
- All other statutory approvals and permissions not mentioned specifically but are required to carry out hassle free construction and operation of the plant.
- Payment to GETCO for system study, SLDC Charges, Connectivity charges ,GEDA registration charges etc. shall be borne by EPC Contractor during project implementation stage.. However all Co- ordination, liaison work, Paper work etc. shall be in the scope of the EPC Contractor.

All approvals, equipment, item and works which are not specifically mentioned in this document but are required for completion of work including construction, commissioning, operation &

maintenance of Solar Photovoltaic Power Plant in every respect and for safe and efficient construction & erection, operation and guaranteed performance are included in the scope of this bid.

5.1.9 Planning and Designing:

- i. The Contractor shall plan and design for the electrical / mechanical / civil requirements including but not limited to plant configuration, space optimization, distance between rows of modules, sufficient passage for vehicle and man-power movement in the plant, mounting structures, location of inverter room, cable routing, selection of equipment and items, procurement plan etc. to enhance plant output for 75 MW (AC) Solar PV Plant site .
- ii. The Contractor has to carry out the complete soil investigation of the site, through Government approved/NABL Accredited laboratory before designing various civil structures. The design of all civil foundations for prefabricated buildings like inverter room and control room, R.C.C structures, buildings etc. Pile foundation or other suitable foundations for MMS structure PV Module foundations, Control room, Invertor room will be carried out considering appropriate seismic zone of the area. All appropriate loads, wind velocity, seismic factors etc. will be considered as per the relevant IS Specifications while designing any civil structure. Also, the environmental conditions, soil characteristics, atmospheric effect, ground water table level, rain water data, land profile, etc. must be considered as per site actual condition and accordingly appropriate precautions and preventive measures will be taken while designing the structures. RCC structures will be adopted considering surrounding weather and soil conditions of site and as per the relevant IS codes. The concrete mix design test irrespective of grade of concrete with minimum 400 kilograms of cement content per M3 concrete along with suitable superplasticiser shall be carried out in Govt. certified laboratory or NABL accredited laboratory.
- iii. The Contractor shall take into consideration all parameters like wind speed, seismic zone, safety factor, soil condition physical and Chemical parameters or properties, chemical analysis of ground water and safe Soil Bearing Capacity (SBC) etc. for the purpose design and construction of civil foundations for all civil work as per relevant IS codes.
- iv. The Contractor shall carryout Shadow Analysis at the site and accordingly design strings and arrays layout considering optimal usage of space, material and labor.
- v. All designs & drawings have to be developed based on the governing standards and requirements of the project and also keeping in mind basic design specifications. Company

may approve minor deviations or suggest required modifications in the same which are meant for increasing plant performance without sacrificing quality / workmanship norms.

- vi. All designs, specifications, reports, etc. submitted or used by the Contractor at any point in time shall first be approved by the Owner /Consultant and revised by Owner /Consultant, if required, prior to execution.
- vii. The technology offered shall be commercially established technology and at least one Project based on this technology shall be satisfactorily operational for at least one year in India. Details of the Project with location and the successful operational period of the Project utilizing this technology shall also be mentioned before the submission of first set of drawings for approvals.
- viii. The Owner reserves right to modify the specifications at any state as per local site conditions / requirements and EPC contractor shall comply with modification without any extra cost and time.
- ix. The Contractor has to arrange the facility for testing bulk material at site such as elcometer for testing the galvanization, cube-testing machine for testing the strength of cube samples etc.
- x. The Contractor has to send samples of the material to Govt. accredited / NABL accredited laboratory for testing as when required by the Owner.
- xi. All the Material, design, specifications etc. Shall comply as per GUVNL's RfS No. No. GUVNL/500 MW/Solar (Phase XIII) dated 03.01.2022 and its PPA attached with tender document.

5.1.10 Approval of Designs / Drawings

- i. All designs, specifications, reports, etc. submitted or used by the Successful Bidder at any point in time shall first be approved by GIPCL and shall be revised by Successful Bidder as per instructions given by GIPCL if required prior to execution, for 75 MW (AC) Solar PV project near Surat Lignite Power Plant of GIPCL.
- ii. The Bidder shall submit in the Bid a comprehensive project management schedule in the form of a Gantt chart CPM/PERT chart and shall be liable for abiding by the schedule.
- iii. The Bidder shall submit in the Bid general engineering drawings of all civil work, including but not limited to, layout of the power plant at different buildings indicating rows of photovoltaic modules, SLD, location of control panels, DC and AC Distribution Boxes,

MMS design, civil foundations and anchoring design / details, shading analysis and generation estimation report etc.

- iv. The bidder shall submit in the Bid technical specifications / Drawings / Designs and datasheets for all electrical work including but not limited to electrical component of the power plant including photovoltaic modules, cables, connectors, junction boxes, inverters, transformers, monitoring and auxiliary systems, etc. for 75 MW (AC) Solar project near Surat Lignite Power Plant of GIPCL .
- v. The Bidder shall submit a comprehensive maintenance schedule for operation and maintenance of the photovoltaic power plant along with checklists and shall be liable for abiding by the schedule. All construction, operation and maintenance procedures shall be carried out through appropriate relevant standards, regulations and labour laws.
- vi. The Bidder/EPC Contractor shall submit the drawing as per Tender specifications for 75 MW (AC) Solar Project site near Surat Lignite Power Plant of GIPCL. Any revision in drawing based on Owner's Comments/observations, in case not confirming to tender specification, then revised document shall be submitted within 03 days. In normal circumstances approval of final drawings will be given by Owner within 10 days from date of submission of revised drawings by Bidder. In case of multiple revision of documents/drawings then complete time taken by Bidder for revision of documents/drawings will be attributed to Contractor's account and no claim will be entertained by Owner on account of delay in approval of drawing/documents.
- vii. The Successful Bidder shall submit to the Owner the documents in hard copy (3 Set) and soft copy to both with proper reference and drawing numbers.
- viii. The Successful Bidder shall submit all drawings in AutoCAD format in addition to PDF.
- ix. The Successful Bidder shall also be submitted a structural Design Basis Report (DBR) for each design, Input / source file of STAAD/STRAP/STRUD/ETABS/ etc for the particular structure to the Owner in hard copy and soft copy for review and approval.
- x. The Successful Bidder has to provide Input/Source file of STAAD / STRAP / STRUD / ETABS /etc and AutoCAD drawings for the patented designs also. The Bidder Shall submit detailed design calculations of foundation, columns, walls, stairs, beams & slabs – all the structural elements in hard as well as soft copy.

- xi. No revisions are entertained once the drawing is approved. If GIPCL is allowing for revision in approved drawing due to valid reason then time required for approval process shall not be accounted for any extension.
- xii. The Contractor has to submit all drawings, which are related to plant for approval and the Contractor, shall not claim any drawing as their intellectual property. Drawing which is developed for project will be the intellectual property of the Owner.

5.1.11 Final Commissioning

The commissioning procedure for 75 MW (AC) Solar Project near Surat Lignite Power Plant of GIPCL shall be as per GUVNL /GETCO/GEDA / GIPCL/ Chief Electrical Inspector to Government (CEIG) requirements. The Contractor shall also liaise and ensure the following:

- i. Obtaining written certificate of commissioning of the facility and permission to connect to the grid from the office of the Chief Electrical Inspector of the state and any other authorized representative from Government of India (GoI) / GoG / GETCO / GIPCL//GEDA/ GUVNL.
- ii. Inspection and successful electrical commissioning certificate from the Owner.
- iii. Obtaining all certificates required by DisCom from agency appointed by them.
- iv. Satisfactory completion certificate towards completion of all other contractual obligations by the Contractor as stipulated from the Owner.

Part Commissioning shall be accepted as per GUVNL RFS document No. GUVNL/500 MW/Solar (Phase XIII) dated 03.01.2022. In case of part commissioning of the project, within 30 days contractor shall complete all pending jobs including but not limited to PV module cleaning etc. After 30 days of part commissioning regular O&M phase shall start for that capacity including obligation for NEEGG as per Tender.

5.1.12 Comprehensive Operation and Maintenance Contract

The Bidder shall separately quote in Appendix 14 for Operation and Maintenance of the power plant for three (3) Years wherein the plant should perform at a minimum annual NEEGG derated every year by not more than 1% referring to the installed DC capacity of the plant indicated by the Bidder. Any damage to CIVIL/ELECTRICAL/MECHANICAL components of the plant is to be reworked/replaced/supplied without any extra cost and time by the Contractor during maintenance

period. This means after completion of O & M period every component of the plant should be in good and working condition.

5.1.13 Terminal Point for the EPC Project

- (a) Complete EPC work for 75 MW (AC) Solar PV Project up to interconnection at 66 kV GETCO sub-station at Village Mosali Dist. Surat OR upto 220kV Switchyard of Surat Lignite Power Plant of GIPCL at Dist: Surat.
- (b) GETCO supervision charges for 33/66/220 kV Power Transmission Lines laying/erection and termination shall be in scope of EPC Contractor including all coordination, work execution, paper work shall be carried out by EPC Contractor.
- (c) GEDA Registration charges are in the scope of EPC contractor along with all coordination and liason work.
- (d) Land will be provided to EPC Contractor as it where it basis and required land development (if any), tree/Vegetation removal (tree cutting permission to be obtained by EPC Contractor and GIPCL may only provide required forwarding letter etc.), site enabling works etc shall be in EPC Contractor's Scope.
- (e) Laying/Erection & Interconnection of 66 KV Power evacuation Transmission lines / underground cable upto 66 kV GETCO Substation at Village Mosali is in scope of EPC Contractor. OR Laying/Erection & Interconnection of 33/66/220kV Power Evacuation Transmission Lines/ Underground cable up to 220kV Switchyard of Surat Lignite Power plant of GIPCL is in the scope of EPC contractor.

Disclaimer: Any civil / electrical / other work, which is not mentioned or included in this Tender document but necessary for the construction and O&M of 75 MW (AC) Solar PV plant near Surat Lignite Power Plant of GIPCL shall be borne by the Contractor. The Contractor shall, unless specifically excluded in the Contract, perform all such works and /or supply all such items and materials not specifically mentioned in the Contract/ Tender Document but can be reasonably inferred from the Contract as being required for attaining completion, commissioning and performance of the facilities, delivering NEEGG and maintaining the plant & achieving NEEGG during O&M period of 75 MW (AC) Solar PV Power Plant as if such work and / or items and materials were expressly mention in the Contract without any extra cost implication and liability to GIPCL. All specifications mentioned in this Tender indicates minimum technical requirement. The



Contractor may propose alternate specifications or design though the final acceptance of the same is subject to the Owner's discretion.

5.2 CIVIL WORK

The scope of work covered in this specification consists of collection of all site related data, supply of all GIPCL (OWNER) approved quality materials, labours, fuel, oils, equipment/machinery, setting up of batching plant (Minimum 15 m³/hr), EJEX transit mixers machine (only for transportation), vibrator, Needle JCB machine, truck/tractor mounted piling machine, total station for pile marking, dumpy level machine, shuttering & MS pipe staging materials, welding machines, gas cutting sets, drill machine, concrete breaker, water tankers, trucks, required nos. of MS templates (for MMS foundations), cube testing machine, all any other required machinery, all type of consumables, design and construction etc. as per detailed Technical Specification for completion of civil work. The scope of work also includes, supply, fabrication, erection of structural materials like insert plate, pipe sleeves, anchor bolt, edge angle, nuts & bolts, hand rails, staircase, ladders, platforms, erection, testing etc. as per details given in the tender document. The scope works shall cover for all services required for completion of civil works in all respect for Solar Power Plant.

Note: For Concrete mixing batching plant of minimum 15m³/ hrs require. Concrete mixing without batching plant shall not be allowed except minor concreting /non-critical structure.

For 75 MW(AC) Solar PV Project, all the material, installations, fixtures, accessories etc. to be provided shall be as per the relevant I.S. specifications. These shall be of best quality and of standard manufacturer as approved by the EIC, when there are no standard specifications. The fresh OPC cement (53 grade) and TMT steel reinforcement bars Fe 500 shall be used confirming to relevant I.S Specifications of the approved manufacturers of GIPCL. The agency has to keep the full proof records of purchase and consumption along with original purchase bills of Cement and Steel and other brought out material as per the GIPCL procedures and rules. The agency has to provide best workmanship with skilled manpower for all the civil items as per the standard specifications/ best practice as approved by the EIC. The booklet Standard Specifications for Civil Works will be applicable wherever there is dispute in the items of civil works. GIPCL will not supply any material for this work.

5.2.1 Topographical Survey:



- i. Topographical survey for 75 MW (AC) Solar Project near Surat Lignite Power Plant of GIPCL shall be carried out by the EPC Contractor of the proposed site at 10 m interval with the help of Total Station or any other suitable standard method of survey. All necessary Reduced Levels (RL) as entered in the Field Book/Soft Copy have to be submitted along with pre contour layout of the total site. The formation levels of the proposed power plant have to be fixed with reference to High Flood Level/ high tide level/accumulation of rainy water of the proposed site. The ground level and plinth level of structures shall be fixed taking into consideration the highest flood level / high tide level and surrounding ground profiles and as specified in subsequent tender clauses.
- ii. Carrying out the Bench Mark (GTS) to site/sites under survey by parallel levelling, establishing and constructing bench mark, grid and reference pillars in the field and spot level survey of the entire area/areas at solar panels locations shall be in the scope of bidders.
- iii. The work shall be executed according to the specifications and good standard practice necessary to fulfill the objective of the survey work, strictly in accordance with the instructions and satisfaction of the Owner.
- iv. The Contractor shall shift Bench Mark by fly-leveling from nearest GTS Bench Mark or available source as approved by the Owner and establish two permanent Bench Mark at site. All subsequent transfer of levels shall be carried out with respect to this shifted permanent Bench Mark. The work shall also include constructing permanent reference pillars at suitable locations as approved by the Owner. These reference pillars shall be labelled permanently with their respective coordinates and reduced levels for future use and shall be protected and kept till the O& M works start. The Bench Marks and reference pillars shall be shown on the survey drawings.
- v. The field work including shifting of co-ordinates for each piles, shifting levels for construction activities shall be carried out using with Total Station Survey Equipment or through GPS and shall be in the scope of bidders.
- vi. Bidder shall use GPS for establishing initial co-ordinates and bench marks at the designated location of 75 MW (AC) Solar Project for the field work.

5.2.2 Soil Investigation of the Site:

- i. Preliminary Geotechnical Soil investigation details are available attached as Annexure-A5. Any other details and information required by the Bidder for design of foundations are to be arranged by bidder at their risk and cost. OWNER does not take any responsibility for the

correctness of the contents given in this Preliminary Soil investigation report. BIDDER/ EPC Contractor is advised to verify the content of report by taking few bore logs at site and analyzing the same before submission of bids. Alternatively, BIDDER may make his own assessment for the type of foundations & electrical resistivity tests envisaged based on this report at his own risk. In any case, the BIDDER/ EPC Contractor has to carryout detailed geo-technical investigation after the award of contract, through some GIPCL approved / reputed agency and submit geo-technical investigation report with recommendation for OWNER's review & approval. The recommendations given in approved final report becomes binding on the Contractor. The Contractor is not eligible to increase his cost or demand any extension of time because the final report is in variance from preliminary report available with GIPCL. The Bidder / EPC Contractor is solely responsible to carry out detailed Geotechnical investigation to ascertain soil and water parameters of the proposed site for the use of planning /designing / construction / providing guarantee / warranty of all civil work including but not limited to foundations / piling for module mounting structures, foundation/piling for Main control room, Inverter room, 33/66/220 kV Power evacuation Transmission lines , 66 kV/220kV switchyard equipment , security cabin, peripheral fencing, lighting arestor, and all other required foundations .. The Contractor shall carry out soil investigation through either KCT (Ahmedabad), Geo Struct (Baroda), M.K. Soil (Ahemdabad) and Unique Lab (Surat), Bhumi Research center (Surat) and NABL accredited labs or agency suggested and approved by GIPCL. These reports shall be furnished to the Owner prior to commencing work.

- ii. The scope of soil investigation covers execution of complete soil exploration including boring, drilling, collection of undisturbed soil sample where possible, otherwise disturbed soil samples, conducting laboratory test of samples to find out the various parameters like chlorides, suphates and other matters mainly related to load bearing capacity, ground water level chemical analysis of ground water, settlement, and soil condition and submission of detail reports along with recommendation regarding suitable types of foundations with various alternatives, suggesting Concrete Grade (minimum grade M25) with minimum cement content 400 Kg/ Cum irrespective of concrete grade (minimum grade M25) to be used and type of cement shall be used for each bore hole along with recommendation for soil improvement where necessary. The design will done based on considering the worst result among the bore holes. Contractor has to carry out also Electrical Resistivity Test.



- 5.2.3 The Contractor shall carry out Shadow Analysis at the site and accordingly design strings and arrays layout considering optimal use of space, material and man-power and submit all the details / design to Company for its review / suggestions / approval.
- 5.2.4 The Contractor for 75 MW (AC) Project site shall obtain and study earthquake, Hydrological data, High flood level, tidal force, scouring depth, and wind velocity data for design of pre-fab buildings for Inverters and control room and other miscellaneous structures, module mounting structure, and considering all parameters related to the weathers conditions like Temperature, humidity, flood, rainfall, ambient air etc.
- 5.2.5 The foundations should be designed considering the weight and distribution of the structure and assembly, and maximum Wind and Seismic factors for the site have to be considered while making the design of the foundation. Successful Bidder shall also plan for transport and storage of materials at site and shall arrange for its own construction power and water. However, the Contractor can avail construction power connection from Discom by applying for temporary connection and has to borne all cost for the same. However, the Contractor can avail i.e. potable construction water from Surat Lignite Power Plant of GIPCL if available or else make their own arrangement for supply of potable water for construction.
- 5.2.6 The Bidder shall estimate the water requirements for cleaning the photovoltaic modules at least once in every week in order to operate the plant at its guaranteed plant performance.
- 5.2.7 Prefabricated structures for control room and inverter rooms shall be strictly as per relevant IS standards with minimum cement content 400 Kg/ Cum irrespective of concrete grade (Minimum grade M25).
- 5.2.8 Land Development and Cleaning: The Contractor shall visit the site to ensure the land development work and do the topographical survey to ensure land development work such that land is perfectly flat. Any overburden or the deposited waste soil stuff of any mass shall be removed from the site and dispose off outside the plant premises at the location shown by GIPCL. The Contractor has to clean the site from wild vegetations, any temporary or permanent structure encountered, small trees and shrubs, uprooting of all vegetations, removal of all debris or soil, if any; filled the depression area and excavates and level the high level areas wherever required even though contractor follows the natural

ground level for entire plant execution. The Contractor can also use the natural contour of the land, if shadow is not affecting the generation. However, the Contractor shall take reasonable care to ensure that the plant is aesthetically designed

5.2.9 Foundations

The contractor is responsible for the detailed soil investigation and subsequent foundation design of the structures in the plant. Following two different site location available for construction of 75 MW Solar Power Plant near Surat Lignite Power Plant of GIPCL.

- (i) Location A: - Almost Vergin land area (except few pockets)
- (ii) Location B: Reclaimed Area (Backfilled area)

The Contractor shall design and construct appropriate RCC civil foundations for Module Mounting Strucutre, prefabricated HOT DIP GI Coated structures / RCC frame structure, Main control room, Inverter room, transformers, switchyard equipment foundations, feeder bay, Peripheral fencing foundation, security/watchman cabin foundation and all othe misc civil foundation for various structure shall be RCC foundation/RCC Under-reamed cast in situ bored pile foundation as per the grotechnical soil investigation report & site requirement and must be submitted for approved of GIPCL prior to construction. The contractor shall provide the detailed design report, drawing with calculations of the proposed foundation for approval. Pedestals over the MMS foundation shall be projected minimum 200 mm above the finished ground level.

The foundations should be designed considering the weight and distribution of the load of structure and its assembly. The foundation shall be designed for maximum wind speed of 180 km per hour (50 m/sec). Seismic effect relevant to the seismic zone of the area and highest flood level has to be considered while making the design of the foundation.

Contractor shall carry out special treatment below foundation, below RCC cable trenches, below RCC floor slab/plinth like rubble soling as required for strengthening sub-base of foundation base on soil characteristics and soil investigation report.

Backfilling after concereting of foundation/trenches shall be carry out using Muroom/river sand or bed ash in the trenches for switchyard, Tranformer foundations and in all type of foundations of rooms and plinth

The Contractor shall design foundation of Module Mounting Structure, Switchyard, Transformer and inverter room, peripheral fencing, watchman/security cabin in backfilled area with utmost care. The foundation in backfilled soil shall be recommended with deep Under-reamed cast in-situ bored piles with reinforcement to avoid any subsequent settlement. The depth of under reamed cast in situ RCC bored pile shall be as per soil data, characteristics & behavior of soil & loading for switchyard, Transformer and inverter room at backfilled area.

5.2.10 All reinforced cement concrete (Below/above ground) for all civil works shall be minimum M25 grade and designed with exposure condition as “Moderate” Environmental weather condition using minimum 400 Kg of ordinary Portland cement (55 grade) as per IS 456 irrespective of Grade of concrete. Contractor has to submit mix design report (Minimum 400 kgs cement) to client for reinforced cement concrete along with admixture for approval before execution. Contractor shall submit batch report of each concrete batch or engage concrete mixer equipment having facility of batch report of each concrete batch. All necessary test related to materials of concrete mix like cement, sand, steel, aggregates etc shall be carried out regularly as per relevant IS code. Test related to concrete like compressive strength, workability etc shall be carried out as per relevant IS Codes. Water proof Ply shuttering of adequate thickness shall be used for above ground & underground watertank work with heavyduty supporting system as approved by GIPCL.

5.2.11 Piling for MMS Structure and other pile foundation for 75 MW(AC) Solar PV Project site:

PILE BORING

- (i) Under-reamed piles with or without bulbs may be constructed by selecting suitable installation techniques at given site depending on sub-soil strata conditions and type of under-reamed piles and number of bulbs.
- (ii) In construction with equipment, initially boring guide is fixed with its lower frame leveled for making desired angular adjustment for piles at batter/rake. Boring is to be done up to required depth as mentioned in the approved drawing.
- (iii) In order to achieve proper under-reamed bulb, the depth of bore hole should be checked before starting under reaming. It should also be checked during under-reaming

and any extra soil at the bottom of bore hole; removed by auger before reinserting the under-reaming tool.

- (iv) The completion of desired under-reamed bulb is ascertained by (a) The vertical movement of the handle and (b) When no further soil is cut.
- (v) In double or multi under-reamed piles, boring is first completed to the depth to the first (top) under-ream only and after completing the under-reaming boring is extended further for the second under-ream and the process is repeated.
- (vi) For Backfilled area, interconnection of pile foundation in lateral/transverse direction may be explored if required to avoid settlement.
- (vii) For backfilled area, MMS foundation using raming of Hot deep GI coated structure beam may be explored based on soil report with interconnection in lateral/transverse direction

Embedments in Piles

- (i) The provision of embedments of (MMS Structure) Zinc coated M S Structure will depend on nature and magnitude of loads, nature of strata and method of installation. It should be adequate for vertical loads, lateral load and moments acting individually or in combination. It may be curtailed at appropriate depths only under the advice of the structural engineer. However, provision of embedments of Zinc coated M S Structure shall be as per design detail submitted and approved by GIPCL.
- (ii) For piles up to 300 mm diameter or above, concreting shall be strictly done by tremie method if the water table is encountered within the designed pile boring depth.
- (iii) The minimum clear cover over longitudinal embedments of Zinc coated M S Structure shall be 50 mm in all directions (i.e. from all edge corners of the MMS structure). In aggressive environment of sulphates etc. it may be increased to 75 mm.

Placing of Concrete

- i. The concrete should invariably be poured through a tremie, with a funnel so that the flow is directed and concrete can be deposited in the hole without segregation. Care shall be taken during concreting to prevent as far as possible the segregation of the

ingredients. The displacement or distortion of MMS Structure during concreting and also while extracting the tremie pipe shall be avoided.

- ii. The concreting should be done with necessary precautions to minimize the softening of the soil by excess water. To avoid collapse of soil during boring bentonite slurry shall be added and during concrete pouring excess bentonite slurry shall be collected in nearby excavated pit. The diameter of the finished pile shall not be less than specified and a continuous record shall be kept by the Engineer as to the volume of concrete placed in relation to the length of pile cast. After each pile has been cast and any empty pile hole remaining shall be protected and back filled as soon as possible with approved material.
- iii. The minimum pile cap shall be 200 mm . The clear cover between the bottom of MMS Structure in to pile from top of pile cap shall be as per design engineering and engineering drawing. The MMS Structure in the pile shall be aligned and levelled for its full anchorage length to permit it to be adequately bonded into the pile and pile cap.
- iv. Normally concreting of piles should be uninterrupted. In exceptional case of interruption of concreting, but which can be resumed within 1 or 2 hours, the tremie shall not be taken out of the concrete. Instead it shall be raised and lowered slowly from time to time to prevent the concrete around the pipe from setting. Concreting should be resumed by introducing a little richer concrete with a slump of about 80 mm for each displacement of the partly set concrete. If the concreting cannot be resumed before final set of concrete already laid, the pile so cast may be rejected.
- v. In case of withdrawal of tremie out of concrete, either accidentally or to remove a choke in the tremie, the tremie may be re-introduced to prevent impregnation of laitance scum lying on the top of the concrete already deposited in the bore. The tremie shall be gently lowered on to the old concrete with very little penetration initially. A vermiculite plug should be introduced in the tremie. Fresh concrete of slump between 80 mm should be filled in the tremie which will push the plug forward and swill emerges out of the tremie displacing the laitance/scum. The tremie will be pushed further in steps masking fresh concrete sweep away laitance scum in its way. When the tremie is buried by about 60 to 100 cms, concreting may be resumed.



- vi. The top of concrete in a pile shall be brought above the +500 mm up to pile cap i.e. cut-off level to permit removal of all laitance and weak concrete to ensure good and monolithic concrete at the top level.
- vii. Concreting shall be done as soon as possible after completing the pile bore. The bore should not be left un-concreted for more than 12 to 24 hours depending upon the stability of the bore hole.
- viii. For placing concrete in pile bores, a tremie pipe (funnel type of arrangement) for ease in pour of concrete should be used and method of concreting should be such the entire volume of the pile before is filled up without formation of voids and/or mixing of soil and drilling fluid in concrete.
- ix. In case the pile bore is stabilized with drilling mud (bentonite slurry) or by maintaining water head within the bore hole, the bottom of bore hole shall be carefully cleaned by flushing it with fresh drilling mud and pile bore will be checked for its depth immediately before concreting.
- x. Concreting shall be done by tremie method. The tremie should have a valve at bottom and lowered with valve closed at the start and filled up with concrete. The valve is then opened so permit the flow of concrete which permits upward displacement of drilling mud (bentonite slurry).
- xi. The pouring should be continuous and tremie is gradually lifted up such that the tremie pipe opening remains always in the concrete. At the final stage the quantity of concrete in tremie should be enough so that on final withdrawal some concrete spills over the ground.

Note: (1) The concrete should be coherent, rich in cement (not less than 400 kg/m³) and slump as per type of foundation. For pile foundation slump shall be 100 to 120 mm..

(2) The tremie pipe should always penetrate well into the concrete with an adequate margin of safety against accidental withdrawal if the pipe is surged to discharge the concrete.

Bidder shall carry out Pull out, Lateral and compression test if bidder has opted for cast in site pile foundation/pre cast pile foundation/Driven pile foundation. Numbers of the test will be as directed by GIPCL (Owner). Numbers of Routine test is also carried as per relevant IS code. If the Bidder is opting for Ramming then necessary test is to be carried out for ensuring it's stability against uplift force, Lateral force and compression force. For pile foundation, pile integrity test shall be carried out by contractor as per directive of OWNER by engaging third party at their cost.

5.2.12 Switch Yard civil works

Switchyard civil work includes step up transformer plinth, HT Switchgear kiosk plinth, two pole 4 pole structure foundation, earth pits, metal spreading curb wall in and around switchyard and its fencing. The foundation of transformer shall be constructed RCC of minimum M25 grade foundation based on design parameter. The transformer/ HT switchgear kiosk plinth shall be made of brickwork conforming to relevant standards. The height of transformer /HT Switchgear kiosk plinth shall be decided based on 66 kV ground clearance. Earth pit construction shall be of 230 thick brickwork, plastered above ground level from outside covered with RCC heavy duty precast slabs. Cable trench in switchyard shall be RCC of M25 grade concrete. After cable laying Joint of the heavy duty precast slab shall be sealed with bitumen/ tarfelt. Switchyard/ double pole area must be surrounded by PVC Coated chain link fencing with / galvanized MS angle of suitable size with double leaf gate will be provided. Area enclosed within this perimeter must be filled with 40/60 mm thick gravel. The fencing specification for switch yard area shall be AS PER GETCO requirements. All cable trench connecting to switchyard & MCC shall be RCC construction with required sub-base treatment. All outside cable trenches shall be cover using heavy duty RCC pre-cast.

Switch yard foundations shall be RCC of minimum M25 grade and structures shall be provided strictly as per GETCO norms / requirements / design.

Switchyard shall be provided with PVC Coated chain link fencing as per applicable standards and as per CEIG with requirement. Earthing of fencing shall be done through flexible wire or through GI flat.

5.2.13 Storm Water Drainage System: The Contractor has to design, submit and take approval from the Client/Consultant for storm water drainage system of the plant. It shall be

designed considering rain fall, catchment area, natural gradient of the plot, outlet of the plot and in such way that it can be easily drain off rain water and by providing sufficient slope. Storm water drain shall be of Trapezoidal section. Bidder can also explore the possibility of rectangular/trapezoidal section as per availability for speedy construction. All the internal storm water drains i.e. on one side of Peripheral road, shall be of brick pitching which is backed up by cement mortar bed which is backed by PCC on bottom of drain and all joints of Brick masonry are to be filled up with cement mortar in C.M. 1:4, further, plaster is to be applied in case of brick masonry surface. The Contractor shall provide RCC Hume pipe of 450 mm dia (NP3 grade) at various locations in central road for easy passage of the water, RCC culvert at the crossing of road, cable corridor/network, other cross drains at required locations as cross drainage work. Contractor has to make necessary arrangement for lifting the accumulated rainy water within plant premises at lowest elevation locations by constructing sloping sides sump with concrete lined of 4 cubic mtr with submersible pump of 50 cubic mtr/hour and 10 mtr head and 20 mtr flexible hose pipe is to be provided with proper electrical panel in enclosure and connected it to storm water drainage for easing O & M activities

5.2.14 Security Cabin: The Contractor shall provide 06 (six) numbers of prefabricated Watchman's portable cabin for both plots such that safety of the plant is ensured along with one Watchman's cabin at the Main Gate of the each plant location based on final switchyard configuration & evacuation plan as mentioned in the Clause 5.1.5. The minimum size of Security Cabin cabin is 1.2 metre x 1.8 metre size and height of 2.4m with appropriate roof projection all around at the top. The + 0.6 mtr FFL of Security cabin for 75 MW (AC) Solar Plant . Location of the watch Cabin (Security Cabin) will be as directed by GIPCL. Small additional toilet block shall be also provided with each watchman's cabin.

WATCH TOWER: Total 08 nos watch tower (for both plots) require of minimum 3.0 meter height with weather proof protection.

5.2.15 Area Lighting

- Area lighting arrangement shall be made to illuminate the entire site at an appropriate lux level for night hours or bad light hours. Road and Perimeter LUX



level min 10 and rest area as per NBC 2016. Area lighting arrangement shall have adequate numbers of lights poles on the sides of roads, periphery, etc.

- The connector box shall be made of stainless steel, Dust & Vermin Proof, which is to be recessed at the base of each Yard Lighting system. The connector box shall have suitable brass or copper made connector terminal.
- The lighting fixtures with control gear shall be mounted on tubular poles of approved height and mounting arrangement.
- All the yard lighting towers and lighting fixtures shall be effectively grounded using adequate size of GI earthing wires / GI earthing strips.
- The light pole shall be fixed in separate foundation. The lighting poles shall be concreted with 1000mm f coping above ground level for pole protection and 1000 mm below ground with minimum reinforcement as per IS requirement..
- The control gear box (non-integral type) shall be encased in the coping.
- Loop in – Loop out power cables shall be brought up to the control gear box through of adequate size for cable protection.
- The cables shall be properly glanded to the control gear box gland plate.
- XLPE / PVC insulated armored Cu/Al cables of adequate size shall be used for interconnection and supply of power to Yard lighting systems.
- Cable terminations shall be made with suitable cable lugs & sockets etc. crimped properly and passed through brass compression type cable glands at the entry & exit point of the connector box and at the entry point to MCB distribution Box for controlling the yard lighting system.
- The height of the area lighting fixtures should not exceed 2.0 mts from ground. Lighting fixtures shall be installed close to fencing.

5.2.16 Fencing: Providing and Fixing PVC Coated chain link fencing along with barbed wire fencing as per drawing attached as ANNEXURE-A4 FENCING and as per the following sequence. Fixing of 08 gauge PVC Coating over 10 gauge GI chain link fencing along with barbed wire fencing as per drawing attached as Annexure A-4 and as per the following sequence. Foundation of fencing shall be designed based on soil investigation report of each locations and as per approval of OWNER. The Foundation of fencing shall be @ 2.5 m c/c including disposal of soil stuff outside the plant premises. Galvanising minimum 80 microns, Fabricating, Fixing, aligning vertical posts of ISA 50 x 50 x 6 MM 2.5 m c/c with 35 X 6 MM Flat with 8 mm Bolt, nut & washers. Also to be run ISA 35 x

35 x 6 MM horizontally with 35 X 6 MM Flat throughout the length with 8 mm Bolt on top & bottom welded with vertical post and with strut angle ISA 50X50X6 at every 05 span @each 12.5 meter & all corners. Concreting/ Grouting the vertical ISA 50 x 50 x 6 MM 2.5 m c/c and strut supports with Concrete Grade- M20 / PCC (1:1.5:3).Transporting and Fixing 08 gauge PVC Coating over 10 gauge G I chain link fencing as per IS: 2721 up to height of 1.50 meter as per drawing to the vertical post of ISA 50 x 50 x 6 spaced at 2.5 meter intervals, reinforced with 8mm dia Bolt with nut and washer all around in each span. Fixing of barbed wire, 5 horizontal and 4 cross wire between post to post with J bolts, nuts and packing for fastening and tightening for the 700 mm height (Total 9 rows) and as directed and as shown in drawing or as directed by GIPCL engineers complete. All the structural steel consumed for PVC Coated G I Chain-link fencing shall be 80 micron Hot dip G I coated.

5.2.17 Watchman's Cabin and Main Entrance Gate:An all-weather main gate with width of at least 6 meter shall be erected at the entrance of the each plant location site. The Contractor shall provide main gate of Hot Dip G I coated structural steel and RCC material of appropriate design for 75 MW (AC) Solar Project sites. Main gate shall be provided with the name of Owner. The name plate material using 3 mm thick Aluminium composite panel (ACP sheet) including printing on 3M or LG Vinyl media with eco-solvent printing with lamination and sticking same on the board as per given details or as directed by Owner. Size/Pattern of the letter shall be as per direction of Owner. Also, necessary arrangement has to be made by Contractor to erect the main gate on RCC structure with sufficient G I hold fast.

- The Prefabricated Watchmens Cabin of size 3.5 metre x 3.5 metre at the main entrance gate with elevated height of + 0.6m from FGL with toilet unit shall be designed in the constructed by the Successful Bidder keeping in view the safety and security of the power plant
- The Bidder shall provide detailed civil, electrical, plumbing, drainage etc. drawings and equipment specifications for the security cabin.

5.2.18 Roads: All the roads connecting the main gate to control room, switch yard and Invertor rooms shall be accessed by Asphalt road.

Contractor may explore the sub-base preparation using fly ash mixing with lime/gypsum.

The road section shall be as under as per MORTH specifications:-

For backfilled area (Bituminous road connecting from Gate to MCC, Switchyard & Inverter rooms):-

| | |
|----------|--|
| Sub-base | :600 mm thick fly ash filling by exploring mixing of sand/gypsum/lime etc. |
| GSB | :200 mm thick |
| WBM/WMM | :200 mm thick |
| BSG | :75 mm thick |
| DBM | :40 mm thick |
| BC | :25 mm with bituminous painting. |

For virgin land area (Bituminous road connecting from Gate to MCC, Switchyard & Inverter rooms):-

| | |
|----------|--|
| Sub-base | :300 mm thick (may vary base on soil condition) fly ash filling by exploring mixing of sand/gypsum/lime etc. |
| GSB | :200 mm thick |
| WBM/WMM | :200 mm thick |
| BSG | :75 mm thick |
| DBM | :40 mm thick |
| BC | :25 mm with bituminous painting. |

Peripheral Road (WBM Road)

| | |
|----------|---|
| Sub-base | :600 mm thick fly ash filling by exploring mixing of sand/gypsum/lime etc |
| WBM | :200 mm thick |

Peripheral WBM road shall be 100 mm and central asphalt road shall be 430 mm above the highest Tide level/level of accumulated rainy water. The road shall be elevated by increasing GSB thickness or by using mixture of Fly ash/lime and sand to stabilise the sub base of road crust. All peripheral roads shall be of WBM. WBM/Asphalt road wherever applicable width shall be of 4m plus shoulder (minimum 750mm both side) and with sufficient thickness to access heavy equipment like transformers/inverters/ switchyard equipment transportation. Contractor shall provide RCC culvert with RCC ramp with suitable gradient for approaching to Inverter room, control room and at main entry point from main approach to inside plant etc. as required. Bidder shall provide NP3 class 300 mm to 600mm diameter Hume pipes for internal/peripheral Road crossing for various services like underground pipeline (potable or washing), communication cables, and electric cables within the plots area. Contractor/ bidder shall provide NP3 class 300 mm to 600mm diameter Hume pipes for cable crossing through the existing roads as required. Further unless otherwise specified all pipes shall be encased with M15 grade of concrete keeping 150 mm cover at all sides. Contractor shall resurface the road after laying of the Hume pipes.

Note: Fly/bed ash (if available) shall be given free of cost from flyash silo of power plant, However, further loading, transportation, unloading using covered truck shall be in the scope of contractor. If flyash/bed ash not available at any reason, bidder shall arrange at their own cost/suitable filling option as approved by GIPCL.

5.2.19 RCC water Tank: The Contractor has to design as per relevant IS codes, submit and take approval from client / consultant and construct RCC/ water tank. For this, the Contractor shall construct and operate 7.5 lacs liter (3 x 2.5 lacs liter) underground, on ground or Elevated RCC with Silting chamber for filtration of water before the inlet which will match with invert level of storm water drain and with GI/Powder Coated/Fibre/Coated sheet cover on top with necessary supporting steel structure. FRP or HDPE (3 to 4 layers) water storage tank are also accepted. Design of RCC water tank shall be such that it shall resist Earth pressure and Water pressure and satisfy all IS codes. Design of water tank shall be done strictly based on Soil Investigation Report with complying all latest IS codes. As per IS 3370 part-1 2009 contractor shall design and execute the underground water tank with minimum concrete M-30 grade.

5.2.20 The walls and floor slab shall be of reinforced concrete construction. The design and construction of these water retaining structures shall be in accordance with IS: 3370 with provision of construction/contraction and expansion joints. Resistance to cracking shall be checked as per cl. 3.3.1 and cl. 3.4.1 of IS: 3370 (PART II). Minimum thickness of structural concrete elements shall be 150 mm. underground water tank walls shall also be designed for condition of external surcharge load along with ground water table and basin being empty.

5.2.21 Concrete for the underground water tank shall have plasticiser cum waterproofing cement additives conforming to IS: 9103. In addition, limits on permeability as given in IS: 2545 shall also be met with. The concrete surface of these structures in contact with soil shall be provided with minimum two coats of bituminous painting of grade 85/25 conforming to IS: 702 @ 1.7 kg/sq.m (minimum) for water / damp proofing. Also provision shall be made on the inner surface of walls and base slab, so that water proofing grouting can be injected later in case of leakage.

5.2.22 Any loose pockets of soil below the basin floor shall be removed and filled back with plain cement concrete of mix 1:4:8.

- 5.2.23 External pressure due to earth and ground water shall not be relied upon to reduce the effect of the internal water pressure, but account shall be taken of the ground water pressure when considering buoyancy or stresses in the empty water retaining structure.
- 5.2.24 Floor slab of water tank shall be designed with due consideration to prevent any possibility of flotation due to upward thrust caused by underground water. Pressure release valves conforming to IS 4558 may be permitted with the specific approval by Owner/consultant. Special care will also be taken to prevent floatation during construction period. The minimum thickness of the basin slab shall be 300 mm. Below PCC & rubble soling 1000mm thick CNS material alternatively for soil stabilisation with mixing slacked lime stone with sand shall be evenly spread over the base area of underground water tank shall be provided and compacted to 95% proctor density.
- 5.2.25 Construction of the water tank base raft & walls shall be watertight with the provision of 225mm wide approved quality PVC ribbed water stops at all construction joints and expansion joints. For Basin and channel base, kicker type of PVC water stops is preferred, whereas in walls water stops with Central Bulb and End Grip will be preferred. It shall be ensured that 225mm wide water stops are also provided all along the edges of common outlet channel at the terminal point and left projecting by half its width, to facilitate later construction by others.
- 5.2.26 The water retaining structures shall be tested for water-tightness in accordance with IS: 3370, without the backfill, if any, placed in position. For open structures, the test head shall correspond to the maximum design water level. Any rectification measures required to satisfy the test criteria shall be executed by the CONTRACTOR at his own cost all as per the directions of the OWNER.
- 5.2.27 In case of underground water tank C I rungs for descending & ascending in to the tank shall be provided. Inside the water tank, 500x500x500 mm size pit shall be provided to facilitate pumping arrangement provision at suitable location to collect and pump out water collection to nearest drains.
- 5.2.28 The water tank shall be so designed that it can be used during construction phase of solar plant and can also meet all other water requirements of the solar plant during O&M Stage. The extension of existing pipe line from terminal point by GIPCL to underground water tank including supply and laying of pipeline shall be in the scope of contractor.

5.2.29 The bidder shall carryout necessary Electrifications works for connection of electrical pumps etc. Bidder shall provide 02 Nos. of minimum 5 HP submersible pumps at each water tank with necessary valve, NRVs, Piping etc.

5.2.30 Water supply: All necessary arrangement for wet cleaning of the solar panels shall be in the scope of the bidders and accordingly the agency has to provide all the necessary equipment, accessories, tool & tackles, pumps, tankers, tractors and piping arrangement which are required for the same. The Bidder shall be provided dry module cleaning system by Robots of proven technology. Bidder shall install Robots to Module installed on structures which are connected 1 number of Invertor (invertor can of any capacity). Installation of Robot for 1 number of Invertor DC capacity is mandatory. Further for total plant capacity bidder can either opt for Dry cleaning by robot or by wet cleaning via pipe line network.

5.2.31 Civil work for Pre-fab Inverter Room/ The FFL +0.6 m from FGL for 75 MW AC Solar Project, for Pre-fab Inverter Room/. Below plinth for Inverter Room shall have cast in situ under-reamed bored pile of adequate depth (for backfilled area), adequate size of RCC raft footing, pedestal columns, plinth beam, grade slab with reinforcement as per relevant IS specifications considering seismic zone, wind and based on detail soil investigation report etc. Backfilling material shall be of Laboratory tested Murram or fine sand/bed ash. Also, Termite proofing is required before preparation of grade slab and plinth protection. Civil work for Pre-fab Inverter Room/ shall be of adequate size and of the standard manufacturer with sufficient lighting points and RCC cable trenches with epoxy painted edge angle of 65mm x 65mm x 6mm and checker plate covers of 8 mm thickness with epoxy paint and shall have exhaust chimney and also sufficient ventilation in terms of approved make aluminium windows and ventilators with MS GI coated grill, approved make exhaust fans and louvers for air circulation. Opening of 3.00 m x 3.00 m with approved make GI rolling shutter shall be provided for the access of the panels. All prefab inverter room shall be laid on RCC plinth with sufficient foundation, and reinforced grade slab with Vitrified of 8-10 mm thickness tile flooring and 100 mm skirting of same tiles. Plinth protection shall be given throughout perimeter of width 1.0m for Inverter rooms. Sufficient steps at the entry of the room and RCC ramp of sufficient angle shall be provided for shifting the equipment in the rooms for all Inverter rooms. Rainwater pipe at various locations with gutter at the top shall be provided to discharge rainwater. Approved

make gear operated Hot dip GI coated rolling shutter shall be provided for Control room and inverter rooms. All pre-fab structure of inverter room shall be suitable match at plinth level to avoid any dust and water ingress. All pre-fab structure shall be water proof from roof to avoid any rain water inside the inverter.

5.2.31.1 Structural Steel, Insulated Walls and Roof for Pre-fabricated Super structure for Inverter room, security cabin :

- i. Design of Super-Structure i.e. Steel Structure like purlin, rafter, columns, truss etc. for fixing the Pre-Fabricated Panels conforming to relevant IS codes and of Jindal/ Tata/ RINL make. It shall include all necessary fitting like nuts, bolts, washers etc, of good quality. All structural steel shall be treated with galvanized structural sections/ Hot dip G I Coatings, specific requirement for thickness of galvanization should be at least minimum /85 microns at any point of the galvanized structure. Galvanization shall be measure with elcometer or the material can be sent for testing laboratory as and when required. No averaging is allowed for measuring the thickness of galvanization. All side shall be galvanization with same specification and shall be maintained for any hollow components of PEB structures. The gap between base plate of structural members and concrete top of foundation shall be filled with GP-2 grouting material of reputed make. The material of all J-bolts shall be of 8.8 Class.
- ii. The Insulated panels should be of required size for roof and walls. The insulated wall and roof panels shall be sandwich type. The panels shall be made out with 0.35mm thick pre coated steel sheet on both side of Poly Urethane Foam (PUF) for both wall and roof. The density of PUF shall be $40 \pm 2 \text{ kg/m}^3$ and thermal conductivity shall be within range of $0.019\text{-}0.021 \text{ W/m}^\circ\text{K}$ at 10°C . The total thickness of the panels for walls shall be 60mm and for roof is 40mm. The panels shall be joined together by tongue and groove method. The joints of the panels shall be filled with silicon or equivalent filling material. Panels shall be cuts such that the exposure of PUF and patch work is avoided. The fixing of the panels shall be such that there should not be any gaps at joints like wall and roof, wall to wall, etc. from which air and water particle can pass (Air and Water tight). Roof panel shall be extended 300mm from the eaves wall and 150mm from Gable walls. Rain water gutter shall be provided throughout the periphery with rain water pipes (CPVC pipes) with proper clamping at regular interval. Provision of future installation of Solar panels on the top of the roof shall be done by “I or C” section with Small base plate assembly.

Note / Options for Construction of Invertor Rooms: For 75 MW (AC) Solar Project site Successful bidder can also propose better or equivalent option for Invertor rooms like a) Reinforced Concrete structure, b) Elevated Structure from the ground c) If container solution is provided by bidder then it can be rested on Pile foundation with necessary structural steel flooring, railing and steps to access d) If IP 65 invertor is provided by bidder then it can also be directly rested on pile foundation with necessary steel flooring, railing and steps to access. Canopy at top is required to cover Invertor. e) Bidder can propose any other option to bidder for construction of invertor room. The proposed option should match minimum applicable specification as mentioned below for RCC super structure. It's at the discretion GIPCL to approve the proposal.

- iii. **Doors, windows, ventilators For inverter rooms & security cabin:** It shall be made out from Aluminium sections. All sections shall be anodized with 20 microns thickness. Sections of Door frame and window frame shall be min 2 mm thick and of approved make. Door shutters shall be made out from aluminium sections and combination of compact sheet and clear float / wired glass with sun film sheet on it. Room shall have required numbers and size of openable window / louvers with sun film sheet to provide adequate ventilation / fresh air circulations. All hardware / fixtures for doors and windows shall be of good quality (make: Dorma, Godrej and Kich) and shall be approved by the Owner. All the windows shall have hot dip GI coated MS Grill. Main door to switchgear room shall be steel door with epoxy paint having adequate area to admit switchgear. There shall be minimum two doors to the switchgear room of flush welded steel type.
- iv. For Electrical panel room, there shall be provision of gear operated GI Rolling Shutter of adequate width and height to facilitate to load / unloading of heavy electrical panels.

5.2.32 Main Control Room cum Conference room

Control cum Conference room shall be of adequate size (minimum height 3.6 mtr from FFL for fixing the panels, battery banks etc. With a) Conference room; b) SCADA Room with Work station with Desktop and Chairs; c) Store Room with almirah; d) Pantry unit of sufficient size with sandwich type of platform with one sink (Nirali Make) plumbing fixture and exhaust fan; e) Toilet unit for Gents with urinals and Ladies having wash basins in each; f) RCC cable trenches with covers and cable trays and all openings of cable entry shall have vemin proofing using spray foam or mortar; g) Furniture like conference



table, chair and sofa etc.; h) Lighting points and fixtures; and i) Plumbing fixtures j) Transformer yard with chainlink fencing and gate adjoining to building (outside). k) All other amenities for the operation & maintenance of Solar Photovoltaic Power Plant. l) All windows shall be equipped with sunflim protection sheet and vista make vertical blind.

5.2.33 Civil work for Control room cum Conference room: RCC frame structure below plinth for Main Control cum Conference Room shall have cast in situ under-reamed bored pile of adequate depth (if required), adequate size of footing, pedestal columns, plinth beam, grade slab with reinforcement as per relevant IS specifications considering seismic zone, wind and based on detail soil investigation report etc. Backfilling material shall be of Laboratory tested Murram or fine sand/bed ash. Also, Termite proofing is required before preparation of grade slab and plinth protection. The Control cum Conference Room shall have approved make GI rolling shutter at the front side and also provision of additional emergency exit door. RCC cable trenches shall be provided with suitable notch angle, insert plats and shall be covered with chequered plats with epoxy paint. The dimension of cable trenches shall be based on electric, SCADA panel dimensions and control cables with sufficient maintenance space. Provision of sump with suitable capacity pump shall be provided in the cable trench for dewatering purpose. All structure steel system shall be painted with two coats of minimum each coat of 100 micron DFT High Build self-priming epoxy primer (Composition: Modified epoxy, cured with polyamidoamine) and two coat of high performance Acrylic Polyurethane high glossy finish paint (Composition: Acrylic resin with urethane hardener, cured with aliphatic isocyanides) of total minimum 50 micron DFT of approved colour shade (gross total minimum DFT shall be 250 micron), as per manufacturer's recommendations, on structural steel including preparation of surface by shot Blasted with grade SA 2.5/ Copper slag and thoroughly cleaning of oil, dirt, dust, rust & scale by fresh water jet cleaning, wire brushing, power tool cleaning, mechanical scrapers, etc. of approved shade either of Asian or Berger make with High / glossy / Mat finish complete in all respect . HDG 8.8 grade foundation bolts shall be provided for erection of pre-fab structure. After erection and alignment of pre-fab structure, bolt shall be grouted using non shrink grout materials.

5.2.34 The building shall be constructed with conventional RCC framed structure up to prefabricated structure bottom (Around +3.65 mtr from FFL) with brick partition walls along with RCC foundation, grade slab, columns, Tie-Beams, Lintle beam, conncting

beam etc. Side cladding shall be of brick wall using red clay bricks with wall in front of transformer yard made sufficiently thick to satisfy fire rating as per LPA regulations. Staircase area shall be protected from fire safety angle as per LPA regulations. Main door to switchgear room shall be fire proof steel door having adequate area to admit switchgear. There shall be minimum two approved quality fire proof door with minimum 2 hrs fire rating doors to the switchgear room of. Control room should have one swing type aluminium glazed double panel door and one single panel door. Windows shall be Aluminium sliding type for switchgear room with wired glass of 6mm. For control room if window is provided the same shall be fixed with 5.0 mm thick sheet glass with aluminium framework. Main entrance of the building shall be of GI rolling shutter with appropriate RCC ramp approach. Roof shall be given access by means of Cage Ladder.

5.2.34.1 Entire MCC building shall be provided with false ceiling. (i) For Pannal room, battery room & switchgear room GIPCL approved quality (Saint gobin) fire proof false ceiling shall be provided. (ii) Gypboard false ceiling shall be provided for other areal of MCC building like office area, conference room, pentry area, scada room, passages etc.. Armstrong or equivalent make false ceiling system shall consist of 600x600x12.5 mm gypboard with one coat of primer and two or more coats of acrylic emulsion paint. The suspension system shall consist of minimum 6 mm diameter galvanised steel rods (or higher as per recommendation of manufacturer) suspended from ceiling supporting aluminium grid of 38x25x1.5 mm and crosstie of 25x25x1.5 mm and aluminium angle of 25x25x1.5 mm.

5.2.34.2 Auxiliary Transformer yard shall be provided with PVC Coated chain link fencing and gates. In case of more than one transformer firewall shall be given to separate the transformer. Soak pit shall be provided below the transformer. The transformer area shall be provided with PCC paving on Rubble soling with drainage arrangement to lead the oily water in to effluent drainage system.

5.2.34.3 Main Control Room building shall be equipped with Toilets, Washbasin, and Two Overhead tanks of 2000 liter of triple layer of sintex made for water storage one over the control room and another shall be for the Pantry & Toilet block, with proper fresh water and sewage arrangement and septic tank, Soak pit shall be provided. Relevant standards have to be maintained for construction. Electrical panel room shall have provision of Ramp of adequate slope and width as well as GI Rolling shutters of adequate size for loading and unloading of Heavy electrical panels or any machineries.

5.2.34.4 The bidder shall submit preliminary drawing / Execution drawings with architectural / structural design and details for approval of the OWNER. Based on any modification or recommendation, if any, the Bidder shall submit six sets of final drawings for formal approval to proceed with construction work. All kind of Construction work shall follow the appropriate IS standards.

5.2.34.5 The Company reserves the right to modify the layout as per requirements.

5.2.34.6 The Bidder shall carryout necessary Civil, Plumbing, Electrical, Furnishing works for the development of Main Control Room building as per the detailed scope of works, technical specification mentioned in the tender as well as per the relevant IS Codes.

5.2.34.7 RCC frame structure shall have adequate size of footing (suitable to the soil condition), columns, plinth beam, grade slab, lintel beam, roof slab, etc. Unless otherwise specified all RCC frame structure shall be of grade M25.

5.2.34.8 Plinth level of the building shall be + 600 mm above Finished Ground level (FGL). Plinth protection 1000mm wide shall be provided all around all the Control Room cum MCC Building along with RCC Garland drain as approved by GIPCL

5.2.34.9 Pre-construction anti-termite treatment shall be done in foundation as well as floor levels.

5.2.34.10 Walls (Side cladding) constructed with red burnt clay brick having compressive strength more than 35 kg / cm². Peripheral wall shall be of min 230 mm thick except for the adjoining wall to Transformer. It shall be of 350 mm thick.

5.2.34.11 **Plastering:** Plastering shall be carried out over RCC and brick works area mainly up to plinth level for Inverter rooms and Control Room cum MCC Building and battery room area.

- a) Plastering shall be applied to all internal, external walls as per IS 1542. Internal plaster shall be of 12 mm thick (1:4) with mala finish, PoP punning, etc.
- b) External plaster shall be 20 mm thick in CM (1:4) (Two layers of 12 mm and 8 mm thick layer) with mixing of waterproofing compound during second layer plaster of 8mm thick.
- c) Ceiling (if any) plaster shall be 6mm thick using CM (1:3).
- d) To avoid cracks all concrete /masonry joints shall be fixed with 24 g Chicken wire mesh before plastering.

5.2.34.12 **Painting:**

- a) Internal Paint: Oil Bound Distemper of approved make and as per recommendation of manufacturer. All internal plaster surfaces of wall & ceiling

shall be painted using three coats of oil bound distemper over one coat primer of approved make and shade.

- b) External Paint: Asian make Apex Paint or equivalent Berger make as per recommendation of manufacturer. All external plaster surfaces shall be painted using two coats of Asian make Apex paint over one coat of primer.
- c) Surface preparation including crack filling, Birla white putty/panning filling etc before painting on wall/ceiling shall be carried out as per manufacturer recommendation and as directed by the Owner. External paint scheme shall be in line with GIPCL Existing structure.

5.2.34.13 Doors, windows, ventilators (for Aluminum): It shall be made out from Aluminium sections mainly for office area, conference room, pantry, toilet etc. All sections shall be anodized with 15 microns thickness. Sections of Door frame and window frame shall be min 2 mm thick and of approved make. Door shutters shall be made out from aluminium sections and combination of compact sheet and clear float / wired glass with sunfilm sheet on it. Room shall have required numbers and size of openable window / louvers with sunfilm sheet to provide adequate ventilation / fresh air circulations. All hardware / fixtures for doors and windows shall be of good quality and shall be approved by the Owner. All the windows shall have MS Grill.

5.2.34.14 For Electrical panel room, there shall be provision of GI Rolling Shutter of adequate width and height to facilitate to load / unloading of heavy electrical panels.

5.2.34.15 **Flooring:** The entire control room flooring shall be provided with 100mm thick M20 grade RCC slab on 75mm thick PCC (1:4:8) with sub-base below of 230mm rubble soling over 600mm compacted CNS filling/available soil. Heavy duty approved quality vitrified tiles of 600mmX600mm X 8-10mm thick. Skirting shall be 150mm high from FFL.

- Toilet: Heavy duty anti-skid **Vitrified tiles** for floor and wall tiles shall be Vitrified tiles of 8 mm/10 mm thickness up to lintel level.
- Entrance Steps: Brickwork and plastering with antiskid tiles.

5.2.34.16 **Cable Trenches:** All internal cable trenches of the Control Room cum MCC Building shall be RCC of M25 grade, based on dimension of electrical panels. All open area of the cable trenches after erection of electrical panels shall be cover with 8mm thick chequered plates with MS angle framing or RCC slab. All cable trenches shall be

constructed using MS angle of 65X65X6mm thick edge angle. All required insert plates, flats shall be embedded in the RCC cable trenches for supporting framing works of panels and for supporting structure of cable trays. The fabrication and erection of Electrical panel supporting structure in the cable trench shall be using MS channels/MS angles as per the arrangements of electrical panels on cable trench. All the structural steel of cable trenches (embedded and open) shall be painted with three coats of synthetic enamel over two coats of primer. Contractor shall have to carry out vermin proofing in all incoming and outgoing cable entry/exit from MCC buildings. All opening of cable shall be sealed with ROXTEC Scheme. Sump in floor require with provision of require capacity of pump, starter, cable etc..

5.2.34.17 **Pantry:** It shall design and constructed with RCC platform with granite top consist of one number stainless steel pantry sink with drain board (of Nirali make) with required inlet water supply and outlet drainage facilities.

5.2.34.18 Design of Roof Structure i.e. Steel Structure like purlin, rafter, columns, truss etc. for fixing the Pre-Fabricated Panels conforming to relevant IS codes and of Jindal/ Tata/ RINL make. It shall include all necessary fitting like nuts, bolts, washers etc, of good quality. All Components of Pre- Engineered Building system for roof shall be painted with two coats of minimum each coat of 100 micron DFT High Build self-priming epoxy primer (Composition: Modified epoxy, cured with polyamidoamine) and two coat of high performance Acrylic Polyurethane high glossy finish paint (Composition: Acrylic resin with urethane hardener, cured with aliphatic isocyanides) of total minimum 50 micron DFT of approved colour shade (gross total minimum DFT shall be 250 micron), as per manufacturer's recommendations, on structural steel including preparation of surface by shot Blasted with grade SA 2.5/ Copper slag and thoroughly cleaning of oil, dirt, dust, rust & scale by fresh water jet cleaning, wire brushing, power tool cleaning, mechanical scrapers, etc. of approved shade either of Asian or Berger make with High / glossy / Mat finish complete in all respect. HDG 8.8 grade foundation bolts with hot-deep galvanizing shall be provided for erection of pre-fab structure. After erection and alignment of pre-fab structure, bolt shall be grouted using non shrink grout materials. The gap between base plate of structural members and concrete top of foundation shall be filled with GP-2 grouting material of reputed make. The material of all J-bolts shall be of 8.8 Class.

The Insulated panels should be of required size for roof and Gable end walls. The insulated wall and roof panels shall be sandwich type. The panels shall be made out with

0.35mm thick pre coated steel sheet on both side of Poly Urethane Foam (PUF) for both wall and roof. The density of PUF shall be $40 \pm 2 \text{ kg/m}^3$ and thermal conductivity shall be within range of $0.019\text{-}0.021 \text{ W/m}^2\text{K}$ at 10°C . The total thickness of the panels for Gable end walls shall be 60mm and for roof is 40mm. The panels shall be joined together by tongue and groove method. The joints of the panels shall be filled with silicon or equivalent filling material. Panels shall be cuts such that the exposure of PUF and patch work is avoided. The fixing of the panels shall be such that there should not be any gaps at joints like wall and roof, wall to wall, etc. from which air and water particle can pass (Air and Water tight). Roof panel shall be extended 300mm from the eaves wall and 150mm from Gable walls. Rain water gutter shall be provided throughout the periphery with rain water pipes (CPVC pipes) with proper clamping at regular interval. Provision of future installation of Solar panels on the top of the roof shall be done by “I or C” section with Small base plate assembly.

5.2.34.19 Acid Brick lining works for Battery room

- a) Cleaning the surface with wire brush & broom brush
- b) Applying One coat of Bituminous primer @ 0.250 gm per m² of Acid Resistant grade confirming to IS 158
- c) Laying 6 to 8 mm th. Acid Resistant grade Mastic lining confirming to IS 9510 over the primed surface
- d) Laying of A R bricks of size 230*115*38 mm class –I as per IS 4860 bedding with potassium Silicate Mortar 6 to 8 mm th. As per IS 4832 part-I
- e) Filling the joints of A R brick 4 to 6 mm wide & 15 to 20 mm depth with Furan based mortar as per IS 4832 part-II

Facilities required for Control cum Conference Room: It shall also have adequate size SCADA cabin with necessary 2 numbers of work station with drawers of Godrej/, 2 numbers Computer and 1 number of LED TV of 48 inch of Sony/ Phillips / Samsung make, 4 numbers of chairs for workstation, 2 Nos. of almirah and split A.C of 1.5 Ton of Voltas/ Hitachi/ Samsung/LG make for operating staff for work station. Conference Room shall also be equipped with conference table of 10 persons with Power Sockets with 10 chairs of Godrej/ and sofas. Conference room shall be equipped with an all-in-one printer cum scanner, landline phone, refrigerator (150 litre) of Voltas/Godrej/Whirlpool make, projector and screen of 2m x 2m. All material, installations, accessories to be provided shall be of best quality and of standard

manufacturer as approved by the EIC/ the Company. All units of the Control cum Conference Room shall have marked signage of SS sheet of 1mm along with engraving words or as approved by GIPCL and filled with black color at all facilities within Control cum Conference room and on all equipment. The lighting points and fixtures shall be of Anchor/Philips make. The fans shall be of Khaitan/Usha/Bajaj make and lights (only LED shall be used) shall be of Philips/Syska/Havells make.

Note / Options for Construction of Invertor Rooms: For 75 MW (AC) Solar Project site Successful bidder can also propose better or equivalent option for Invertor rooms like a) Reinforced Concrete structure, b) Elevated Structure from the ground c) If container solution is provided by bidder then it can be rested on Pile foundation with necessary structural steel flooring, railing and steps to access d) If IP 65 invertor is provided by bidder then it can also be directly rested on pile foundation with necessary steel flooring, railing and steps to access. Canopy at top is required to cover Invertor. e) Bidder can propose any other option to bidder for construction of invertor room. The proposed option should match minimum applicable specification as mentioned below for RCC super structure. It's at the discretion GIPCL to approve the proposal.

5.2.35 Electrical requirements for Control cum Conference Room:

- 5.2.35.1 The Panels shall have adequate inputs to take in from the centralized Push Button Switching Unit having Suitable Mimic with Power flow Indicator & Status Indicator of different PCU's.
- 5.2.35.2 The Panel shall be floor mounted type. All the measuring instruments such as feeder voltmeter, ammeter, frequency meter, Electronic Energy Meter (for measuring the deliverable units (kWh) for sale), selector switches, Mimic etc. shall be in the front panel.
- 5.2.35.3 All the Power cables shall be taken through backside of the Panel via sufficient /concrete cable trench and cable trays with cover at top.
- 5.2.35.4 The Panel shall be fitted with suitable rating & size, HRC fuses/circuit breaker/isolator indicators for all incomer and outgoing terminals, voltmeter & ammeter with suitable selector switches to monitor & measure the power to be evacuated.
- 5.2.35.5 Nuts & bolts including metallic cubicle shall have to be adequately protected against atmosphere and weather prevailing in the area.
- 5.2.35.6 The overall dimension shall be fitted with other Power Conditioning Units of the Power Plant. However, dimension, weight, sheet thickness, painting etc. should be indicated by

the Bidder. The bill of material associated with the equipment should be clearly indicated while delivering the equipment.

5.2.35.7 The Contractor shall provide to the Owner detailed civil, electrical, plumbing, etc. drawings and equipment specifications for the inverter/ control room and take approval from client/consultant. The drawings of Panels with the make of components should be approved from the Owner.

5.2.35.8 All the design & drawing related to switch yard / interconnection with grid should be as per requirement of GETCO and approved from GETCO.

5.2.35.9 Pre-fab structure shall have sufficient number of lighting point/ACDB/MCB board.

5.2.35.10 **Toilet:** Toilet shall be designed for 10 persons; and constructed with following finish

- **Floor: Vitrified tiles**
- Door and window: made out of aluminium sections, 5mm float glass
- Ventilators : Mechanical exhaust facility
- Plumbing fixtures : Jaquar, L&K and Kohler make
- Sanitary ware : Hindware, Cera or equivalent make
- EWC : 390 mm high with health facet, toilet paper roll holder and all fittings
- Urinal (430 x 260 x 350 mm size) with all fittings.
- Wash basin (550 x 400 mm) with all fittings.
- Bathroom mirror (600 x 450 x 6 mm thick) hard board backing
- CP brass towel rail (600 x 20 mm) with C.P. brass brackets
- Soap holder and liquid soap dispenser.

5.2.35.11 **Water Supply for Toilets:** All plumbing and sanitary shall be of GIPCL approved make. CPVC pipes of approved make & brand shall be laid down for water supply Two (02) Nos of three layered Sintex Water tank of 2000 Ltr capacity shall be installed for Control room / Conference room & Toilet / Pantry..

5.2.35.12 **Drainage for Toilets:** Drainage pipes shall be of 200 mm dia. UPVC (6 kg/cm²) Supreme, Prince or equivalent make. Gully trap, inspection chambers, septic tank for 10/15 person and soak well to be constructed for above mentioned requirement. **Air Conditioner for Control Room:** The control room shall be equipped with appropriate numbers of fans for effective heat dissipation. The SCADA cabin and Conference room shall have split type air conditioning units.

5.2.35.13 **Fire Extinguishers:** Liquefied CO₂ fire extinguisher shall be upright type of capacity

10 kg having IS: 2171. 7 IS: 10658 marked. 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. Bidder shall provide 10 no. of portable fire extinguisher as given below.

5.2.35.14 **Sand Bucket:** Sand buckets should be wall mounted made from at least 24 SWG sheet with bracket fixing on wall conforming to IS 2546. Bucket stands with four buckets on each stand shall be provided in the Transformer Yard – 4 Nos.

5.2.35.15 **Sign Boards:**

The sign board using 3 mm thick Aluminium composite panel (ACP sheet) with framing of 1" Sq. bright steel pipe (CRC) including printing on 3M or LG Vinyl media with eco-solvent printing with lamination and sticking same on the board as per given details containing brief description of various components of the power plant as well as the complete power plant in general shall be installed at appropriate locations of the power plant.

- For Switchyard and Transformer Yard: The Signboards shall be made of using 3 mm thick Aluminium composite panel (ACP sheet) with framing of 1" Sq. bright steel pipe (CRC) including printing on 3M or LG Vinyl media with eco-solvent printing with lamination and sticking same on the board as per given details of not less than 3 mm. Letters on the board shall be with appropriate illumination arrangements.
- All Inverter Rooms and Control and Conference Room: The name boards using 3 mm thick Aluminium composite panel (ACP sheet) with framing of 1" Sq. bright steel pipe (CRC) including printing on 3M or LG Vinyl media with eco-solvent printing with lamination and sticking same on the board shall be made of 300mm height and fixed at the entry of the all facilities.
- The Contractor shall provide to the Owner, detailed specifications of the sign boards.

5.2.36 Quality Control Laboratory

5.2.36.1 A fully equipped quality control laboratory shall be established at site with qualified personnel to conduct acceptance test on all construction materials, concrete cubes, compaction of soil testing samples etc. This laboratory shall be housed in a covered building. All testing equipment like Owen, Electrical operated cube testing machine,

Sieves for grading of sand & aggregates, flakiness and elongation index testing sieve, Density of Aggregate, Electrically operated vibratory aggregate sieve, jars for sand testing, Abrasion testing equipment, Impact testing equipment, Bitumin testing equipment like thermometer, marshall test apparatus etc.

5.2.36.2 Cube moulds, Slump cones, Vicat apparatus, Moisture meter, Soil testing equipments shall be arrange for laboratory. Contractor shall arrange for design mix of concrete for each grade of concrete from GIPCL approved external laboratory or NABL.

5.2.36.3 All testing equipment shall be periodically calibrated to the satisfaction the Owner.

5.2.36.4 **Landscaping:** For 75 MW (AC) Solar Project site, Landscaping in surrounding area of MCR is to be done using aesthetically pleasing and suitable varieties of flora with utilizing proper idea of Horticulture. In front of entry of MCR, Two patches of approximate 150 Sqmtr landscaping with parapet of proper height and granite on its top is to be designed. Sun Dial/Sun Clock is also to be provided within front area.

5.2.36.5 **Burnt oil tank:** Design as per CEIG requirements. All RCC work in line with underground water tank as mention above in clause no.5.2.16 to 5.2.24.

TEST SHEDULE

| SR. | Materials | Name of Laboratory Tests | Frequency of Test |
|-----|------------------------------------|---|--|
| 1 | 2 | 3 | 4 |
| 1 | SAND | 1. Fineness Moduler 2. Specific Gravity 3. Water absorption 4. Alkali reaction 5. Specific gravity 6. Gradation | One Test per working seasons or with change of source. |
| 2 | CRUSHED METAL KAPACHI FOR CONCRETE | 1. Gradation 2. Water absorption 3. Impact value 4. Absorption. 5. Specific gravity 6.Soundness 7.Flakiness 8.Elongation | One Test for season or with change of source. |
| 3 | C.C.Cube Workability test. | 1. Compressive Strength (7 Days & 28 Days) | As per IS 456 Standard. |
| 4 | T.M.T BAR | 1.Yield Elongation Test IS:1608 1972 2. Bent Test IS: 1590 196 | One sample for each lot. |

| | | | |
|--|--|--|--|
| | | 3. Releained (In case of HYSD bars only) Chemical property test for Carbon, Phosphorous and Mn. | |
|--|--|--|--|

5.2.37 BUILDING MATERIALS

A1: GENERAL MATERIALS

| Sr. | MATERIALS/ ITEMS | VENDOR / MANUFACTURERS |
|-----|--|---|
| 1. | The cement shall be used of type ordinary portland cement-53 grade | ULTRATECH SANGHI SIDHHI ACC JAYPEE CEMENT Ambuja JK Lakshmi |
| 2. | REINFORCEMENT STEEL HYSD/TMT BARS GRADE FE 500 | SAIL TISCO RINL THERMAX ELECTROTHREM |
| 3. | ALUMINIUM SHEETS | HINDALCO INDAL JINDAL, |
| 4. | P.V.C PIPES/ CPVC pipes | FINOLEX SUPREME TRUEBORE |
| 5. | VITRIFIED CERAMIC TILES (USE OF EPOXY AT JOINT) | NITCO RAK BRAND , KAJARIA, ASIAN,GRANITO OR AS SPECIFIED IN ITEM |
| 6. | GLASS | FLOAT GLASS : SAINT GOBIN MODI GLASS |
| 7. | GEAR OPERATED G I ROLLING SHUTTERS | SURAJ ROLLING SHUTTERS BARODA OR APPROVED MAKE BY OWNER , |
| 8. | RED CLAY BRICKS | APPROVED MAKE BY OWNER |
| 9. | FLUSH DOORS | GODREJ, FALCON PLYWOOD AND INDUS- GODHRA GREEN PLY KIT PLY OR APPROVED MAKE BY OWNER |
| 10. | STAINLESS STEEL | SS – 304 GRADE FROM SALEM STEEL PLANT |

| | | |
|-----|--|--|
| 11. | WATER PROOFING | APP SHEET OF TIKIDAN, FOSROC or PIDILITE |
| 12. | PAINTS | ONLY BRAND NAMES GIVEN : BERGER ASIAN ICI |
| 13. | SEALANTS | FOSROC SICA |
| 14. | R.C MANHOLE COVER | PRECONS PRECAST CONCRETE PRODUCT CO. OR EQUIVALENT |
| 15. | HARDENERS | FOSROC SICA |
| 16. | PLYWOOD PRODUCTS | IPM, NOVOPAN PARTICLE BOARDS BHUTAN BOARDS NUWOOD PARTICLE BOARDS OR APPROVED MAKE BY OWNER |
| 17. | ALUMINIUM DOORS, WINDOWS, PARTITIONS | GODREJ INDAL JINDAL |
| 18. | WATER PROOFING COMPOUNDS/ADMIXTURES/ EPOXY FLOORING | MATERIAL OF CONSTRUCTION FOSROC SICA PIDILITE |
| 19. | ALL TYPE PAINTS AND ACRYLIC DISTEMPERS, EPOXY, WEATHER PROOF PAINTS AND EXTERIOR EMULSION PAINTS | ASIAN PAINTS BERGER. |
| 20. | DOOR CLOSERS | EVERITE MAKE OR APPROVED MAKE BY OWNER |
| 21. | METAL CLADDING SYSTEM, SANDWICH PANEL | TATA BLUE SCOPE, LLOYD INSULATIONS (INDIA) LIMITED, KING SPAN TURKEY SINTEX |
| 22. | PUTTY | BIRLA ASIAN BERGER, |
| 23. | PLASTICISER/ADMIXTURE | FOSROC SIKA, |
| 24. | ACID /ALKALI RESISTING PAINT | ASIAN BERGER |
| 25. | NON SHRINK GROUT MATERIAL | FOSROC |

| | | |
|-----|--|---|
| 26. | GYPSUM FALSE CEILING (gyp board)/ Fibre Glass board | ARMSTRONG/SAINT GOBAIN |
| 27. | FIRE PROOF DOOR | TATA,GODREJ OR APPROVED MAKE BY OWNER. |

A2. SANITARY AND WATER SUPPLY WORK (INTERNAL) (FIRST QUALITY TO BE-USED)

| SR. | MATERIALS/ ITEMS | VENDOR / MANUFACTURERS |
|-----|--|--|
| 1. | RCC PIPES | APPROVED MANUFACTURER CONFORMING B.I.S. STANDARD |
| 2. | G.I. PIPE | TATA MEDIUM CLASS. |
| 3. | G.I. FITTINGS | “R” BRAND |
| 4. | CPVC Pipes | FINOLEX,SUPREME AND ANY OTHER APPROVED BRAND |
| 5. | SLUICE VALVES, CHECK VALVES ETC. | LEADER ENGINEERING WORKS, JALANDHAR; KIRLOSKAR BROS. LIMITED, PUNE; |
| 6. | BRASS FITTINGS | LEADER ENGINEERING JALANDHAR; L & K MATHURA, |
| 7. | C.P., FITTINGS | L & K make & JAQUAR |
| 8. | W.C. PAN WASH BASIN, URINALS SINK LOW DOWN FLUSHING CISTERN | EID, PARRYWARE, HINDUSTAN SANITARYWARE, CALCUTTA; KOHLER |
| 9. | STAINLESS STEEL SINK WITH DRAIN BOARD | NIRALI OR APPROVED MAKE BY OWNER |
| 10. | MIRRORS | PHILCO, ATUL GLASS WORKS, VALLABH GLASS WORKS, GOLDENFISH |
| 11. | WHITE GLAZED & COLOUR GLAZED CERAMIC TILES. | H&R JOHNSON TILES, SPARTEK, NITCO |
| 12. | GLAZING GLASS. | MODI FLOAT SAINT GOBAIN. |

A3. STRUCTURAL STEEL

| SR. | MATERIALS/ ITEMS | VENDOR / MANUFACTURERS |
|-----|--------------------|------------------------|
| 1. | WELDING ELECTRODES | ADOR, D&H , ESSAB |

| | | |
|----|---|--|
| 2. | STRUCTURAL STEEL RAW MATERIALS | TISCO, SAIL, JINDAL, RINL AND OTHER REPUTED ISI MARKED M S STRUCTURE APPROVED BY GIPCL |
| 3. | ANCHOR BARS | BRIGHT BARS |
| 4. | SHEETING AND SANDWICH PANELS FOR PRE_ENGINEERING WORK | TATA BLUE SCOPE, SINTEX JINDAL, KIRBY |

NOTE:

- (1) Wherever the make is not specified for any other items, the Contractor shall submit credential for vendors for relevant items / equipments, out of which the Owner shall decide acceptance of vendor based on review of credentials. This shall have no price implication. The Owner reserves the right to reject the proposed vendor without assigning any reason.
- (2) Bidder may suggest /request for approval of Additional vendor with credentials and details for review and approval of Owner. The Owner may consider the request in case proposed additional vendor is reputed and meeting the tender specification requirements. The Owner reserves the right to reject the proposed vendor without assigning any reason.

5.2.38 Clean up of Work Site

After completion of all works, the Contractor shall have to demobilize all the equipments, machinery and materials from plant premises. The Contractor shall have to clean the entire area by removing all unwanted construction materials, unwanted temporary structures, debris, and excess earth, all type of scrape, wastage and unwanted materials from plant premises as directed by the Owner.

5.2.39 Module Mounting Structures (MMS)

- i. The MMS structure should be designed for an optimum tilt angle (fixed / single axis tracking) so as to meet the offered NEEGG. The angle should be systematically optimized for maximum energy generation throughout the year based on location and local weather variables for each module technology. MMS structure design is combination of two elements named Substructure and Super structure. For MMS structure; pile concrete foundation impart as a substructure foundation and plays significant major roll and for that following shall be considered for 75 MW(AC) Solar Project site near Surat Lignite Power Plant of GIPCL.

- ii. The MMS structures and foundation shall be designed considering total project life of at least 25 years. The structures design shall be appropriate and innovative. It must follow the existing land profile. The foundation system for MMS shall be designed as per geo technical/soil investigation report.
- iii. The design calculations shall be as the codes & standards as mentioned in relevant sections in this document. The Contractor shall submit to the employer the detailed foundation & structural design drawings along with calculations and bases/ standard, Bill of Materials, entire specifications, STAAD PRO Analysis Report, Shadow analysis report showing the effect of shadow of various structures and buildings on the energy output of PV Array as per the Engineering Information Schedule.
 - (a) Mix design of pile concrete shall be considered as per “moderate environmental” exposure condition with minimum cement content shall be 400 Kg/Cum and minimum grade of concrete shall be M25 .
 - (b) The pile foundation may be along with bulb based on design requirement. The depth of the pile shall only be decided based on soil investigation report and other parameters of design Geotechnical investigation findings.
 - (c) EPC contractor may explore possible design along with Transverse / longitudinal or both directions RCC beam to reduce depth of pile considering backfilled area. Intermediate or end pile may shall be required to execute for the better stability. Owner may review the designs and have rights to approve or reject the proposal.
 - (d) EPC contractor may explore possible design for backfilled area like (1) Under reamed deep pile foundation (2) Direct ramming of vertical MS beam pushing . Proper design with back-up documents as per relevant IS standards is required to be submitted to Owner for approval. Owner may review the designs and have rights to approve or reject the proposal.
 - (e) EPC contractor may explore the possible design of directly ramming the vertical pole into the ground. Proper design with back-up documents required as per relevant IS standards to be submitted with consideration of Soil characteristics and ground water properties. . Owner may review the designs and have rights to approve or reject the proposal.
- iv. The MMS structure should be safe, and designed to allow easy replacement of any module and easy access to the O&M staff. It should be designed for simple mechanical and electrical installation, should support Solar PV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly and there should be no requirement of welding or

complex machinery at site. Irrespective of design, none of the components shall be less than 1mm.

- v. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from Solar PV panels at the same time it will withstand severe cyclonic storm with wind speed up to maximum 180 Kmph.
- vi. It shall support Solar PV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly. There shall be no requirement of welding or complex machinery at site and is strictly not allowed.
- vii. Seismic factors for the site to be considered while making the design of the foundation/ramming etc. Or any technology. The design of array structure shall be based on soil test report of the site and shall be approved from the Owner/ Consultant. Before final approval of drawing/design pile foundation for any type of structure i.e MMS, MCR, LCR etc pile load test shall be conducted and result shall be submitted to GIPCL.
- viii. The Contractor has to plan for pile load test like pull out, lateral and compression of minimum 10,10,3 are required to be conducted for each plot at strategic location, immediately after receiving LoI. Based on the results of above-mentioned tests, final approval for design of pile shall be provided.
- ix. Modules shall be mounted on a non-corrosive support structures (EPDM rubber gasket /Stainless Steel Star Washer). The frames and leg assemblies of the array structures shall be made of hot dip Galvanized steel per ASTM A123.
- x. Column Post of Module Mounting Structure shall have minimum thickness of 2.5mm for 75 MW (AC) Solar Project.
- xi. MMS Structure shall be Hot dip galvanize (HDG), specific requirement for thickness of galvanization should be at least minimum 80 microns for any point of the galvanized structure. Galvanization shall be measure with elcometer or the material can be sent for testing laboratory as and when required. No averaging is allowed for measuring the thickness of galvanization. Inner side galvanization with same specification of any hollow components of module mounting structure is mandatory.
- xii. All nuts and bolts (fasteners) shall be made very good quality stainless steel of grade SS 304 required for module fixing and for other components of MMS, superstructure or switchyard, inverter room, control room, etc. in the plant premises nuts and bolts (fasteners) shall be of MS material with minimum Grade HDG: 5.6.

- xiii. Modules shall be clamped / bolted with the structure properly. The material of construction shall be Al / Steel. Clamps / bolts shall be designed in such a way so as not to cast any shadow on the active part of a module.
- xiv. Module to module earthing is mandatory.
- xv. Module mounting structures shall also be earthed through proper separate earthing.
- xvi. The material of construction, structural design and workmanship shall be appropriate with a factor of safety of not less than 1.5 in all types of checks in design calculations.
- xvii. For multiple module mounting structures located in a single row, the alignment of all modules shall be within an error limit of 5 mm in vertical / horizontal line.
- xviii. The Contractor shall provide to the Owner the detailed design, specifications and calculations of the MMS and take approval from the Owner/Consultant.
- xix. The Contractor shall specify installation details of the Solar PV modules and the support structures with appropriate diagrams and drawings.
- xx. The Module Mounting Structure design shall be certified by a chartered structural engineer and it is mandatory.
- xxi. The Contractor should design the structure height considering highest flood level at the site. The minimum clearance between the lower edge of the module and the ground shall be the higher of (i) above highest flood level at the site and (ii) minimum 500 mm for 75 MW (AC) Solar Project.
- xxii. String Cables should be passes from Pipes and Cable-ties shall be used to hold and guide the Pipes (cables/wires) from the modules to inverters or junction boxes.
- xxiii. The Contractor shall provide to the Owner the detailed design, specifications and calculations of the MMS.
- xxiv. Curing of all piles shall be done thrice a day and be maintained for a period of seven days from the date of casting.
- xxv. The Contractor has to ensure sufficient lighting arrangement for all concreting activities during night time. Sufficient illumination should be ensured in and around areas wherever civil and construction activities take place during night time.
- xxvi. The Contractor shall specify installation details of the Solar PV modules and the support structures with appropriate diagrams and drawings.
- xxvii. The Bidder shall be permitted ramming of the module mounting structure provided that they obtain consent of EIC. EIC shall provide such consent once it is convinced that such ramming shall not in any way deteriorate the strength of the structure and shall not reduce the

structure's strength to enjoy a working life of more than 25 years. The design should be done by considering the life of the structure of 25 years.

- xxviii. Civil foundation design for Module Mounting Structures (MMS) as well as control room, inverter room shall be made in accordance with the Indian Standard Codes and soil conditions, with the help of Licensed Structural Designer having substantial experience in similar work. The Successful Bidder shall submit the detailed structural design analysis along with calculations and bases/ standards in the Bid for approval of OWNER.
- xxix. Module Mounting Structures Design is to be certified by Chartered Structure Engineer and certificate to be produced along with the design details for approval by GIPCL.

5.2.40 Switchyard structures / transmission line structure designs shall be strictly as per GETCO design. The structural components of Switchyard shall be HDG of minimum 85/100 microns.

- i. The data furnished for soil investigation and Geotechnical investigation data reports of 75 MW (AC) Solar Project site is for indicative purpose only. Bidder has to execute detail survey, soil investigation (soil texture with chemical and physical properties), ground water analysis and properties with recommendations of the concern expertise and based on real data bidder shall finalise the design of MMS structure with piling, prefabricated structure and other structures based on actual detail geotechnical soil report, water analysis, water table and topographical survey report.
- ii. Followings shall be considerable criteria / parameter for the structure design on the realistic data of geo technical data investigation and collection.
- For piling
 - Depth of pile
 - Bentonite slurry for pile boring based on water table.
 - Requirement of bulb within the pile to increase of friction.
 - Height of pile cap (accumulation of tidal water/ stagnant) water.
 - Use of Tremie pipe based on depth of pile & water table.
 - Height of MMS structure
 - Concrete Mix design.
 - Irrespective of Grade of concrete minimum cement content shall be 400 Kg/cum of concrete.



- Type of cement shall be decided based on soil investigation report however, minimum Ordinary Portland cement (53 grade) shall be utilised for all concrete.
- Selection of Pre-fabricated Structure for inverter rooms and main control room.
 - Pre-fabricated Structure with Hot dip galvanize (HDG) minimum 80 microns G I coating over M S Structure for Inverter Room.
 - Pre-fabricated Structure with Epoxy paint over M S Structure for roof of Main Control Room. All Components of Pre- Engineered Building system shall be painted with two coats of minimum each coat of 100 micron DFT High Build self-priming epoxy primer (Composition: Modified epoxy, cured with polyamidoamine) and two coat of high performance Acrylic Polyurethane high glossy finish paint (Composition: Acrylic resin with urethane hardener, cured with aliphatic isocyanides) of total minimum 50 micron DFT of approved colour shade (gross total minimum DFT shall be 250 micron), as per manufacturer's recommendations, on structural steel including preparation of surface by shot Blasted with grade SA 2.5/ Copper slag and thoroughly cleaning of oil, dirt, dust, rust & scale by fresh water jet cleaning, wire brushing, power tool cleaning, mechanical scrapers, etc. of approved shade either of Asian or Berger make with High / glossy / Mat finish complete in all respect.
 - Pre-fabricated Structure with False floor system along with pre-fab cable trench provision.
- Reinforcement
 - All reinforcement steel shall be of FE 500 grade as per relevant IS Standard.

5.3 DETAILED ELECTRICAL WORK (For 75 MW (AC) Solar Project)

Design & Engineering Basic Engineering, Syatem study, Fault level calculations, Detailed Design and Engineering of Grid Interactive Solar PV Plant and its associated Civil, Electrical & Mechanical auxiliary systems including preparation of foundation drawings, single line diagrams, installation drawings, electrical layouts, design calculations etc. Design memorandum and other relevant drawings and documents required for engineering of all facilities within the scope to be provided under this contract, are covered under contractors scope of work.

- a. The Contractor shall submit to the Employer necessary documents, drawings, data design and engineering information in 3 (three) Hard & Soft copies from time to time as per the

Engineering Information Schedule. The Engineering Information Schedule shall be finalized in consultation with the Employer

- b. Design Memorandum/Design Basis Report The Contractor shall prepare and submit to the Employer a “Design Memorandum/ Design basis Report” of the Plant fulfilling the contract specification/requirement. The memorandum shall include the design philosophy, methodology, system description, input parameters for design, major technical features, basic arrangement/ layout etc.

All the equipment and accessories covered under this specification shall be designed, manufactured and tested in accordance with the latest revision of the standards mentioned under respective section.

They shall also conform to the requirements of latest editions / amendments of the following:

| | |
|-----------|---|
| CEA | Installation and Operation of meters Regulations 2006, 2010, 2014, 2019 and Draft for 4th amended. |
| CEA | Technical Standards for Connectivity to the Grid Regulations, 2007, 2013, 2019 |
| CEA | Grid Standard Regulation 2010 |
| CEA | Guidelines on Cyber Security in PowerSector 2021-1, Dated 7-10-2021 |
| CEA-PCD | Various Recommendation of 'Standing Committee on Communication System Planning in Power Sector' |
| CEA | Technical Standards for Communication System in Power System Operations) Regulations, 2020 |
| CEA | Indian Electricity Grid Code 2006, 2010 |
| CEA | National Power Committee recommendation from time to time. |
| CEA | Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters Regulations, 2009, May 2018, Feb-2021 |
| CEA | Safety · Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations, 2011. |
| CEA | Measures relating to Safety and Electricity Supply Regulations, 2010, 2015, 2018, 2019 and Draft Regulation 2021 |
| CEA-PSETD | Guidelines For Availability of Spares And Inventories For Power Transmission System (Transmission Lines & Substation/Switchyard) Assets |
| CEA | General Guidelines for 76/400/220/132 KV Substations and switchtards for Thermal and Hydro Power Projects-2012 |

| | |
|------------|--|
| CEA | Technical Standards for Construction of Electrical Plants and Electric Lines 2010 & 2015 |
| CEA-PSETD | Standard specification for transformers for solar park pooling station-June'2021. |
| CEA-PSETD | Standard specification for transformers and reactors(66 kV and above Voltage Class) - Apr'21 |
| CEA Letter | Short Circuit withstand testing of Transformer as per CEA's Regulation -Sep-2014 |
| CEA | Manual On Transmission Planning Criteria-Jan 2013 |
| CEA | Draft Procedure for coordinated transmission planning through the Regional Standing Committees for Power System Planning |
| POSOCO | Technical Specification for Interface Energy Meters, Automated Meter Reading System and Meter Data Processing for Inter State System in Western Region As approved in 34th TCC/WRPC meeting held on 28 July 2017 |
| POSOCO | consolidated procedure for first time charging / Energization (FTC) and intigration of New or modified power system element-June-20 |
| CIGRE | 529 Guidelines For Conducting Design Reviews For Power Transformers |
| CEA | Deviation Settlement Mechanism and related matters Regulations, 2014 with all amendment. |
| CERC order | Detailed Procedure For “Grant of Connectivity To Projects Based On Renewable Sources To Inter-State Transmission System |
| CEA | Guidelines for the Validity Period of Type Test(s) Conducted On Major Electrical Equipment In Power Transmission |

- Indian Electricity Act and rules framed there-under
- Fire insurance regulations
- Regulations laid down by the office of the Chief Electrical Inspector to Government
- CEA guidelines / regulations
- GERC regulations
- CBIP manual on substations
- CBIP manual for Transformers
- CEA standard technical specification for Transformers

- CBIP manual for Busducts
- Any other regulations laid down by the local / central authorities
- CEA (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2019

Further All equipments like , Current transformers, voltage transformers and tariff meters shall meet the requirements of the CEA / Electricity Regulatory Commission / Transmission Utility / PSOSCO/ RLDC or similar competent authorities. Indicative list of such requirements is as under and its amendments time to time.

- **System design parameters**

| Nominal System Voltage Parameter | 66 kV | 220kV | 33 kV |
|--|--|----------------------|--------------|
| Highest system voltage (kV) | 72.5 | 245 | 36 |
| Rated frequency | 50Hz | 50Hz | 50Hz |
| No. of phases | 3 | 3 | 3 |
| Rated insulation levels | | | |
| (i) Lightning impulse withstand voltage (1.2/50 micro sec.)(kV _{peak}) | 325 | 1050 | 170 |
| (ii) Switching impulse withstand voltage (250/ 2500 micro sec.) dry and wet (kV _{peak}) (phase to earth) | - | - | - |
| (iii) One-minute power frequency withstand voltage dry(kV _{rms}) | 140 | 460 | 70 |
| Minimum corona extinction voltage (kV _{rms} phase to earth) | - | - | - |
| Maximum Radio Interference Voltage for any frequency between 0.5 MHz to 2.0 MHz in all positions (micro volts) | | 1000 (at 156 kV rms) | |
| System neutral earthing | As per system requirement or Effectively earthed | | |

- Values given in the table are preferred values, however, better values may be adopted based on system requirement.

- The above parameters are for installations at altitudes upto 1000m above mean sea level (MSL). For higher altitudes, Insulation level requirements shall be kept higher as per relevant standards.

DETAILED SCOPE OF WORK

1. Contractor shall be responsible for design and engineering of overall system/station, and all elements, systems, sub-systems, facilities, equipment, material, etc. The Contractor shall submit design calculations, drawings, codes, codes of practices, construction drawings, etc. for Employer's approval.
2. The basic design shall include, but not limited to, the following:
 - a. Development of general arrangement.
 - b. Development of detailed layout (plan & section/elevation) drawings.
 - c. Development of single line diagram with parameters of equipment and details of protection.
 - d. Protection and control philosophy and selection of protection, control and annunciation schemes.
 - e. Development of interlocking schemes.
 - f. Development of switchyard structures loading details.
 - g. Development of earthing system
 - h. Development of direct stroke lightning protection system.
 - i. Insulation coordination of the HV equipment.
 - j. Calculation of static and dynamic force load, and selection of spacer spans equipment terminal loading.
 - k. Development of clearance diagrams.
 - l. Lighting design, Lux Level calculation and conduit wiring diagram.
 - m. Development of power & control cable laying and termination schedules.
 - n. Relay setting calculations.
 - o. Development of erection key diagram with bill of material.
 - p. Foundation design and construction drawings.
 - q. Development of cable trench layout and sections and construction drawings.
 - r. Effect of nearby conductors due to electric field adjoining building and providing shielding.
3. Contractor shall furnish detailed drawings for the various equipment covered in their scope for Employer's approval. The equipment shall conform to type tests as per



specification and applicable standards and reports of the same shall be furnished for approval.

4. Contractor shall furnish design calculations and construction drawings for all civil works showing details of pockets to be left in foundations and embedment to be provided in cable trenches. Contractor shall furnish the schematics, general arrangement drawings, cable schedules, interconnection schedules, panel wiring diagrams, etc. for various control and relay panels for Employer's approval. Contractor shall also furnish the recommended relay settings to be adopted.
5. The Contractor shall note that the list of standards specified elsewhere in this specification is not complete. Whenever necessary the list of standards shall be considered in conjunction with specification, IS & IEC.
6. Exposed live parts shall be placed high enough above ground to meet the requirements of Indian Electricity Rules and other statutory codes. All responsibilities regarding co-ordination with Electrical Inspection Agencies and obtaining clearance certificate from them rests with the Contractor.
7. The outdoor bus-bars in Switchyard shall either of the rigid type with tubular aluminium bus conductor or flexible stranded conductor with aluminium conductor steel reinforced (ACSR) or all aluminium alloy conductor (AAAC) or other suitable conductors. The conductor of appropriate rating and the number of conductors to be used in case of bundle conductors shall be selected considering power flow requirements, corona effect and ambient conditions. For the rigid bus- bar arrangement, aluminium pipes conforming to relevant standard shall be used.
8. For Switchyard, the equipment interconnections shall be through IPS Al. tube/ ACSR conductor or equivalent. All the interconnections with Main Bus shall be through ACSR conductor or equivalent conductor. All the 'T' off connections shall be provided with a bye pass utilizing two PG clamps for each 'T' off. As far as possible, the conductor shall pass without cut/joints unless otherwise necessary for planned shutdown/ maintenance. All equipment shall be supplied with suitable terminal connectors. The terminal connector shall be well coordinated with the type/size of conductor and equipment to be connected. The conductor terminations for equipment shall be either rigid or expansion type suitable for IPS Al. tube or horizontal or vertical take-off suitable for ACSR conductor or other suitable conductors. The exact requirement & type of terminal clamps would be finalized by the Contractor in consultation with Employer based on layout requirement. The terminal pads shall



- preferably be capable of taking the required conductor span under normal, short circuit and meteorological conditions, without effecting the performance of the equipment.
9. The rigid bus bars for equipment inter connections shall have rigid connections at one end and expansion /flexible at other end. The tubular Al connections shall have not more than one joint per span. Since no wastages are permissible, the bidder shall workout the cut lengths of Aluminium tube based on the finalized layout & dispatch the same to site without requiring Owner's approval. Corona Bell shall be provided at the end of the rigid busbars. The connectors and clamps shall be rated same as the connected equipment.
 10. The minimum vertical distance from the bottom of the lowest porcelain part of the bushing, porcelain enclosures or supporting insulators to the bottom of the equipment base, where it rests on the foundation pad shall be 2.55 meters. The bidder to note that the total height of the equipment such as CT, CVT, LA, Isolator, BPI etc. along with structures shall meet the min. electrical clearances.
 11. All equipment shall be suitable for hot line washing.
 12. The Contractor shall cooperate in all respects and exchange the necessary technical data/drawings with other agencies and Employer's other Contractors under intimation to Employer to ensure proper coordination and completion of work in time.
 13. Short circuit force calculation shall be submitted by the bidder as per relevant IEC for flexible & rigid bus as applicable. This short circuit force shall be considered for designing of Tower, Girder and equipment structures and their foundation as applicable.
 14. The sag tension, conductor spacing, short circuit forces, spacer location, conductor swing and clearances shall be carried out in accordance with IEC 60865 to achieve the specified clearances.
 15. All overhead stringing shall be carried out by minimum double tension String insulator assembly.
 16. Gravel filling shall be provided in Switchyard bay area with broken stone filling which shall consist of two layers. The first layer shall be 75mm thick base course of 20mm of normal size and second layer shall be 75 mm thick surface course of 40 mm nominal size.
 17. All the cables used for the switchyard shall be armored type.
 18. The Shield wire tension shall be min. 0.8T. The foundations and structures etc. shall be designed accordingly.

19. The pit size of transformer shall be designed for minimum 1000 mm beyond the physical dimensions of the transformer.
20. In Switchyard per feeder one bay marshaling box (BMK) is to be provided. The duplicated power supplies for BMK shall be extended.
21. The switchyard shall be provided with roads for approach for major equipment for maintenance purpose.
22. The control & protection panels shall be located in switchyard control building.
23. The cable trenches shall be extended to the proposed Bays. The Contractor shall construct the common sections suitably of appropriate sizes up to common points so that the same can be extended in future.
24. For earthing 50x6 mm GS flat shall be used in all cabinets, MOM boxes, panels and balance all other earthing such as all equipment, towers, LM, cable trenches etc. shall be through 75x12mm GS Flat.
25. Two (2) nos. of suitable industrial socket and suitable power cable for oil filtration equipment for Transformers shall be provided.
26. The illumination level shall be 20 lux in general and 50 lux on equipment boxes.
27. Voltage drop for sizing of power cables shall not be more than specified in relevant regulation. The connectors and clamps shall be rated same as the connected equipment.

5.3.1 Photovoltaic Modules

The Contractor shall supply solar PV Module of Crystalline-Si (Poly / Multi or Mono / Single) solar technology only. The Contractor shall provide detail Technical Data Sheets, Certifications of Standard Testing Conditions (STC: defined as Standard Testing Condition with air mass AM1.5, irradiance 1000W/m², and cell temperature 25°C) as per the latest edition of IEC 61215 and IEC 61730-2nd Edition and as tested by IEC / MNRE recognized test laboratory. The Bidder shall also specify the minimum guaranteed energy output of solar PV module as per the site condition in the RFP.

- i. The PV modules to be employed shall be of minimum 72 cell configuration with rated power of module ≥ 325 Wp as certified for solar PV module power performance test as prescribed by latest edition of IEC 61215 and IEC 61730 and as tested by IEC / MNRE recognized test laboratory. The maximum tolerance in the rated power of solar PV module shall have

maximum tolerance up to +3%. No negative tolerance in the rated capacity of solar PV module is allowed.

- ii. All modules shall be certified IEC 61215 2nd Ed. (Design qualification and type approval for Crystalline Si modules), IEC 61730 (PV module safety qualification testing @ 1000 V / 1500 V DC). IEC 62804 Certified PV modules should be PID free, documents for the same should be submitted with conditions of the PID test should be for a humidity of 85 % and a cell temperature of 85⁰ C at 1000Volts or 1500 Volts , IEC 62716 , IEC 61701.
- iii. The certified Bill of Material (BOM) to be used in the PV Modules should be the same as used during the IEC certification of reference PV Module certified by renowned agency like TUV, UL, etc.
- iv. Minimum certified module efficiency shall be 16% for crystalline with minimum fill factor of 0.75. The permissible maximum temperature coefficient of power (Pmpp) shall be -0.43%/°C or better.
- v. All photovoltaic modules should carry a performance warranty of >90% during the first 10 years, and >80% during the next 15 years. Further, module shall have performance warranty of > 98% during the first year of installation. Degradation of PV module for first year shall be limited to 3% and shall not be more than 0.7% in any subsequent year.
- vi. The module mismatch losses for modules connected to an inverter should be less than 1%.
- vii. SPV module shall have module safety class-II and should be highly reliable, light weight and must have a service life of more than 25 years.
- viii. The PV modules shall be equipped with IP67 or higher protection level junction box with min. 3 bypass diodes of appropriate rating and appropriately sized output power cable of symmetric length with twist locking connectors.
- ix. The SPV module shall be made up of high transmittivity glass & front surface shall give high encapsulation gain and the module shall consist of impact resistance, low iron and high transmission toughened glass. The module frame shall be made of corrosion resistant material, which shall be electrically compatible with the structural material used for mounting the modules.
- x. Module shall be made up of mono or poly-crystalline silicon cells. The module should be PID resistant. The front glass used to make the crystalline silicon modules shall be toughened low iron glass with minimum thickness of 3.2 mm (2.5mm for glass-to-glass frameless & 2.0mm for glass to glass framed module). The glass used shall have transmittance of above 90% and with bending less than 0.3% to meet the specifications.

The module shall not be subjected to any point load during transportation, handling and erection and complete care has to be taken to avoid any undue loading on either side of the module. The SPV modules shall have suitable encapsulation and sealing arrangements to protect the silicon cells from environment. The encapsulation arrangement shall ensure complete moisture proofing for the entire life of solar modules.

- xi. The interconnected cells shall be laminated in vacuum to withstand adverse environmental conditions. The EVA used for the modules should be of UV resistant in nature with gel content of more than 70%. The back sheet used in the crystalline silicon-based modules shall be of 3 layered structure. The thickness of back sheet should be of minimum 300 microns with water vapour transmission rate less than 2.0g/m²/day (38°C at 90% RH). The Back sheet can be fluoropolymer based or of any other well proven technology details of which shall be submitted and reviewed during detailed engineering and shall be subject to Employer's approval. The backsheet shall have globally benchmarked durability properties on Moisture barrier, Tensile Strength (Machine Direction & Transverse Direction), Elongation retention and UV stability and shall be able to withstand system voltage. In case of glass-to-glass frameless module, the back glass shall have a minimum thickness of 2.5mm and for glass to glass framed modules, the back glass minimum thickness shall be 2.0mm.
- xii. The module frame shall be made of corrosion resistant materials, preferably having aluminum anodized finish. The anodizing thickness shall be 15 microns or better. In case the offered module is frameless, suitable retaining clips/clamps used for installing the modules shall not damage the glass surface in contact with the retaining clamp
- xiii. The module frame should have been made of Aluminium or corrosion resistant material, which shall be electrolytically compatible with the structural material used for mounting the modules with sufficient no. of grounding/installation.
- xiv. All materials used for manufacturing solar PV module shall have a proven history of reliability and stable operation in external applications. It shall perform satisfactorily in relative humidity up to 85% with temperature between -40°C to +85°C and shall withstand adverse climatic conditions, such as high speed wind, blow with dust, sand particles, saline climatic / soil conditions and for wind 180 km/hr on the surface of the panel as per IEC61215.
- xv. Modules only with the same rating and manufacturer shall be connected to any single inverter. Modules shall compulsorily bear following information in the form of ID encapsulated with solar cell in the manner so as not to cast shadow on the active area and to be clearly visible from the top.



- xvi. Each module should have two 4 sq.mm stranded UV resistant cables as per of TUV specification 2 Pfg 1169/08.2007/EN 50618 and terminated with connectors adaptive to MC4 type connector directly. MC4 type connector should be TUV/EN 50618 certified.
- xvii. The Bidder shall provide to the Owner in the Bid, power performance test data sheets of all modules. The exact power of the module shall be indicated if the data sheet consists of a range of modules with varying output power.
- xviii. Only those crystalline modules(above 300Wp) of the same module manufacturer which has supplied for a capacity more than 100MW in other projects in India with minimum 1 project size of 10 MW. On this account, the Contractor shall provide full information, to the satisfaction of GIPCL, before placing final order for the modules. The Contractor shall also submit the proof of original purchase.
- xix. GIPCL or its authorized representative reserves the right to inspect the modules at the manufacturer's site prior to dispatch.
- xx. The Bidder is advised to check and ensure the availability of modules prior to submitting the Tender Document.
- xxi. PV Modules shall comply all the applicable BIS certification, Manufacturing & Testing standards as specified by MNRE/SECI/GUVNL/CEA/CERC from time to time.
- xxii. Before finalisation of Solar PV Module Vendor, QAP alongwith Grade A PV Cell shall be approved by GIPCL.
- xxiii. Bidder shall submit Third-party verified PAN files for any one module, if bidder is offering three wattage bins or less. In case the bidder is offering more than three wattage bins, additional PAN files for each additional wattage bin need to be submitted. Bidder shall also submit Self-certified Electro- Luminescence (EL) Test reports of all the **Crystalline Silicon based** PV Modules being offered to GIPCL.
- xxiv. The bidder has to submit, along with the data sheet of the module, a detailed Bill of Material (BoM) elaborating on the properties, such as, thickness, material composition etc of the components of the module which shall be same as per the type tested and approved Constructional Data Form (CDF).
- xxv. Each PV module deployed must use a Radio Frequency identification (RFID) tag for traceability. RFID shall either be placed behind name plate sticker or behind bar code label pasted on the back glass of PV module and must be able to withstand harsh environmental conditions during the module lifetime. One number RFID reader has to be supplied by the bidder which has to be compatible to read the data from the RFID Tag & download the data

to Computer. All associated Software & Cables are to be provided along with the RFID reader. The following information must be mentioned in the RFID used on each module.

Table 5-1 Information to be displayed on solar PV module

| Sr. | Particulars |
|-----|--|
| 1 | Name of the manufacturer of the PV module and RFID code |
| 2 | Name of the manufacturer of solar cells |
| 3 | Month & year of the manufacture (separate for solar cells and modules) |
| 4 | Country of origin (separately for solar cells and module) |
| 5 | I-V curve for the module at standard test condition (1000 w/m ² , AM 1.5, 25°C) |
| 6 | Wattage, Imp, Vmp, Isc, Voc, temperature co-efficient of power and FF for the module |
| 7 | Unique Serial No. and Model No. of the module |
| 8 | Date and year of obtaining IEC PV module qualification certificate |
| 9 | Name of the test lab issuing IEC certificate |
| 10 | Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001 |

5.3.2 Junction Box / Combiner Box

- i. The Contractor shall provide sufficient no. of Array Junction Boxes / PV combiner boxes / DCDBs.
- ii. All switch boards shall be provided with adequately rated copper bus-bar, incoming control, outgoing control etc. as a separate compartment inside the panel to meet the requirements of the Chief Electrical Inspector of Government (CEIG). All live terminals and bus bars shall be shrouded. The outgoing terminals shall be suitable to receive suitable runs and size of cables required for the Inverter/Transformer rating.
- iii. The degree of protection for following equipment shall be:
 - Outdoor Junction Box: IP 65 or above, with canopy
- iv. All junction/ combiner boxes including the module junction box, string junction box, array junction box and main junction box should be equipped with appropriate functionality, safety (including fuses, grounding, etc.), string monitoring capabilities, and protection.



- v. The terminals will be connected to copper bus-bar arrangement of proper sizes to be provided. The junction boxes will have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables. Suitable markings shall be provided on the bus-bars for easy identification and cable ferrules will be fitted at the cable termination points for identification.

The Array Junction Box shall also have suitable type-II surge protection device. In addition, over voltage protection shall be provided between positive and negative conductor and earth ground such as Surge Protection Device (SPD) or on-load DC disconnectors with shoes. All incoming & outgoing cables must be terminated in junction boxes with polyamide glands or PV connector receptacles. The rating of the Junction Boxes shall be suitable with adequate safety factor to inter connect the Solar PV array.

- vi. The Junction Boxes shall have suitable arrangement for the followings
- Provide arrangement for disconnection for each of the string / input.
 - DC disconnecter for group array isolation
 - The rating of the Junction Boxes shall be suitable with adequate safety factor to inter connect the Solar PV array.
- vii. The junction boxes shall be dust, vermin, and waterproof and made of thermoplastic/ metallic in compliance with IEC 62208, which should be sunlight/ UV resistive as well as fire retardant & must have minimum protection to IP 65(Outdoor) and Protection Class II or higher. Junction box shall be designed for 1000V DC or 1500V DC system as applicable.
- viii. The terminals will be connected to copper bus-bar arrangement of proper sizes to be provided. The junction boxes will have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables.
- ix. The current carrying rating of the Junction Boxes shall be rated with standard safety factor to interconnect the Solar PV array.
- x. Based on proven practice / design bidder may consider interconnection of maximum two strings with “Y” connector and accordingly solar cable sizing shall be designed.
- xi. Suitable markings shall be provided on the bus-bars for easy identification and cable ferrules will be fitted at the cable termination points for identification.
- xii. Adequate capacity solar DC fuses & isolating disconnectors should be provided. Fuses and monitoring facility for each string/ input including spare terminals shall be provided. The String Junction Box must have adequate space for maintenance and spare input

terminals. For SJB without 25 inputs 2 inputs shall be kept in spare, for SJB with more than 25 inputs 3 inputs shall be kept in spare.

- xiii. Detailed junction box specifications and data sheet shall be provided in the Technical Bid document.
- xiv. Other Sub systems and components used in the SPV power plants (Cables, connectors, Junction Boxes, Surge Protection devices, etc.) must also confirm to the relevant international /national standards for electrical safety besides that for quality required for ensuring expected service life and weather resistance. It is recommended that the interim, the cables of 1000-1800 Volts DC for outdoor installations should comply with the draft EN 50618 for service life expectancy of 25 years.

5.3.3 Inverter and Power Conditioning Unit (PCU)

- i. Only those PCUs/ Inverters which are commissioned for more than 100 MW¹ capacity (1000V DC) or 40 MW capacity (1500V DC) in other solar PV projects till date shall be considered for this project. The Contractor has to provide sufficient information to the satisfaction of GIPCL before placing the final order for PCUs/Inverters. Power Conditioning Unit (PCU) shall consist of an electronic inverter with latest technology available in the market along with associated control, protection and data logging devices and must be fully communicable to SCADA with OPEN Communication Protocol. If any software required for the communication & SCADA, the same to be made available within the EPC package by the Contractor.
- ii. Warranty of 10 year shall be provided for the Inverter and Power Conditioning Unit (PCU) on all of its components.
- iii. All PCUs should consist of associated control, protection and data logging devices and remote monitoring hardware, software for string level monitoring.
- iv. Dimension and weight of the PCU shall be indicated by the Bidder in the Bid.
- v. Capacity of single unit of inverter shall be min. 1,000 kW.
- vi. No. of inverters to be supplied shall be worked out by the Contractor based on DC rating of inverter, Pnom ratio, limit on overloading capacity.

¹This is to be noted that 100 MW capacity is for the Inverter manufacturer to test their strength and capability for supplying for this Project.



- vii. The Bidder shall guarantee average annual power loss due to non-threshold condition to be less than 0.1% and shall support the claim with necessary document / data / graphs in the Bid.
- viii. DC Injection into the grid: This shall be avoided by using a step-up transformer at the output of the inverter. DC injection shall be limited to 0.5 % of the rated current of the inverter as per IEC 61727.
- ix. Inverters shall be capable of operating at varying power factor preferably in between 0.85 lag to 0.85 lead and shall be able to inject or absorb reactive power.
- x. Inverters shall operate at ambient temperature of 50°C without deration.
- xi. The up-time of Inverters should be of 99% in a year, in case of failing to achieve this due to failure of any component of inverter the Contractor shall either replace the inverter or the component at his own cost.
- xii. All inverters shall be tested for IEEE 519 & IEC 62116 standard.
- xiii. DC input terminals must be in enough numbers so as each terminal is connected to dedicated single input. Two DC inputs shall not be connected on the single input DC terminal of the inverter. Each input shall have suitable fuses and current measuring device whose values shall be displayed in PCU display and also on MODBUS protocol for SCADA communication. If adequate number of input are not available in the selected inverter by the Contractor then a DC junction box with protection devices such as fuse, current measuring device for each input, DC disconnects and copper busbar with rated current carrying capacity may be incorporated in to design. The Bidder has to indicate the selected parameters in the Bid.
- xiv. The minimum European efficiency of the inverter shall not be less than 98% measured at 100% load as per IEC 61683 standards for measuring efficiency. The Bidder shall specify the conversion efficiency of different loads i.e. 25%, 50%, 75% and 100% in the Bid. The Bidder should specify the overload inverter capacity in the Bid.
- xv. The PCU shall be tropicalized and design shall be compatible with conditions prevailing at site. Provision of exhaust fan with proper ducting for cooling of PCU's should be incorporated in the PCU's, keeping in mind the extreme climatic condition of the site.
- xvi. The inverters shall have minimum protection to IP 65(Outdoor)/ IP 21(indoor) and Protection Class II or higher.
- xvii. Nuts & bolts and the PCU enclosure shall have to be adequately protected taking into consideration the atmosphere and weather prevailing in the area.

- xviii. (Grid Connectivity) Relevant CEA/CERC/GERC/MNRE/MINISTRY OF POWER regulations/Guidelines and grid code as amended and revised from time to time shall be complied. The system shall incorporate a uni-directional inverter and should be designed to supply the AC power to the grid at load end. The power-conditioning unit shall adjust the voltage & frequency levels to suit the Grid.
- xix. All three phases shall be supervised with respect to rise/fall in programmable threshold values of frequency.
- xx. The inverter output shall always follow the grid in terms of voltage and frequency. This shall be achieved by sensing the grid voltage and phase and feeding this information to the feedback loop of the inverter. Thus control variable then controls the output voltage and frequency of the inverter, so that inverter is always synchronized with the grid. The inverter shall be self-commutated with Pulse width modulation technology.
- xxi. This should be capable of synchronize maximum within 1 Minutes.
- xxii. The PCU shall be capable of controlling power factor dynamically.
- xxiii. Busbar to be used for AC/DC termination in the inverter shall be copper busbar only
- xxiv. Maximum power point tracker (MPPT) shall be integrated in the power conditioner unit to maximize energy drawn from the Solar PV array. The MPPT should be microprocessor based to minimize power losses. The details of working mechanism and make of MPPT shall be mentioned by the Bidder in the Bid. The MPPT must have provision for constant voltage operation. The MPPT unit shall confirm to IEC 62093 for design qualification.
- xxv. The system shall automatically “wake up” in the morning and begin to export power provided there is sufficient solar energy and the grid voltage and frequency is in range.
- xxvi. Sleep Mode: Automatic sleep mode shall be provided so that unnecessary losses are minimized at night. The power conditioner must also automatically re-enter standby mode when threshold of standby mode reached.
- xxvii. Stand – By Mode: The control system shall continuously monitor the output of the solar power plant until pre-set value is exceeded & that value to be indicated.
- xxviii. Basic System Operation (Full Auto Mode): The control system shall continuously monitor the output of the solar power plant until pre-set value is exceeded & that value to be indicated.
- xxix. 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. In addition, it shall have following minimum protection against various possible faults.

- a. Earth Leakage Faults: The PCU shall have the required protection arrangements against earth leakage faults and –Ve DC directional protection.
 - b. Over Voltage & Current: In addition, over voltage protection shall be provided between positive and negative conductor and earth ground such as Surge Protection Devices (SPD).
 - c. PCU shall have arrangement for adjusting DC input current and should trip against sustainable fault downstream and shall not start till the fault is rectified.
 - d. Galvanic Isolation: The PCU inverter shall have provision for galvanic isolation. Each solid state electronic device shall have to be protected to ensure long life of the inverter as well as smooth functioning of the inverter.
 - e. Anti-islanding (Protection against Islanding of grid): The PCU shall have anti islanding protection. (IEEE 1547/UL 1741/ equivalent BIS standard).
 - f. Unequal Phases: The system shall tend to balance unequal phase voltage.
 - g. Heat Transfer / Cooling / Built in Ventilation Systems must be provided with 20% Spare capacity. Bidders to Submit Heat Rejection / Transfer calculation for Air Conditioning of Inverter Room.
 - h. Inverter must be provided with –Ve earthing for protection of PV modules against possible “Potential Induced Degradation”.
- xxx. Reactive Power: The output power factor of the PCU should be of suitable range to supply or sink reactive power. The PCU shall have internal protection arrangement against any sustained fault in the feeder line and against lightning in the feeder line. Further, Inverter should be capable to supply reactive power as per CEA/CERC/RLDC guidelines or suitable capacitor bank should be installed to meet the reactive power requirement.
- xxxi. Isolation: The PCU shall have provision for input & output isolation. Each solid-state electronic device shall have to be protected to ensure long life as well as smooth functioning of the PCU.
- xxxii. All inverters/ PCUs shall be three phase using static solid state components. DC lines shall have suitably rated isolators to allow safe start up and shut down of the system. Circuit breakers used in the DC lines must be rated suitably.

- a. Sinusoidal current modulation with excellent dynamic response.
 - b. Compact and weather proof housing.
 - c. Direct use in the outdoors with outdoor housing.
 - d. Comprehensive network management functions (including the LVRT and capability to inject reactive power to the grid).
 - e. No load loss < 1% of rated power and maximum loss in sleep mode shall be less than 0.05%.
 - f. Unit wise & integrated Data logging.
 - g. Current Hall Effect sensor shall be provided on the incoming DC terminals of Inverters.
- a. Dedicated Prefab compartment required for Ethernet for networking.
 - b. PCU shall have protection against over current, sync loss, over temperature, DC bus over voltage, cooling fan failure (if provided), short circuit, lightening, earth fault, surge voltage induced at output due to external source, power regulation in the event of thermal overloading,
- xxxiii. It shall have bus communication via interface for integration, remote control via telephone model or mini web server, integrated protection in the DC and three phase system, insulation monitoring of PV array with sequential fault location. Alternatively, the same can be provided through SCADA.
- xxxiv. Ground fault detector which is essential for large PV generators in view of appreciable discharge current with respect to ground.
- xxxv. The power conditioner must be entirely self-managing and stable in operation. A self-diagnostic system check should occur on start up. Functions should include a test of key parameters on start up.
- xxxvi. Over voltage protection against atmospheric lightning discharge to the PV array is required.
- xxxvii. **Standards and Compliances:**

The Bidder also has to confirm the PCU specifications in the Bid.

Table 5-2 Detailed Specifications of PCU

| Sr. | Particulars | Details |
|-----|---------------------------|---|
| 1 | PCU Mounting | As per the design |
| 2 | Nominal AC Output Power | ≥ 1000 kW |
| 3 | Nominal AC Output Voltage | 415 Volts +15%/-10% AC / 270 V / As per design |



| | | |
|-----------|--|--|
| 4 | Maximum Input Voltage | 1000 V /1500 V DC / As per Design |
| 5 | Wave Form | Pure Sine wave |
| 6 | DC voltage range, MPPT | As per design |
| 7 | Minimum Efficiency at 100% load The rated European efficiency (Euro Eta Efficiency) and peak efficiency | $\geq 98\%$, measured as per IEC 61683 standard for measuring efficiency. * Inverter No Load / Full Load Loss Calculation must be submitted by the Bidder. |
| 8 | Output frequency | 50 Hz +3% to - 5% Hz |
| 9 | Power Factor | 0.85 lag- 0.85 lead |
| 10 | Max. THD at rated power | Less than 3 % |
| 11 | Ambient dry bulb temperature range | 0 to 50° deg C |
| 12 | Humidity | 15% to 95 % non- condensing |
| 13 | Enclosure | IP 21/ IP 65 (Indoor/ Outdoor rated) IEC-60068-2 (environmental) |
| 14 | Protection rating (as per IEC-60721-3-3) | Classification of chemically active substances: 3C2 Classification of chemically active substances: 3S2 |
| 15 | Grid Specifications | IEC 61727, VDE 0126 |
| 16 | Nominal Voltage & Frequency | 415 Volts & 50 Hz |
| 17 | Voltage Tolerance | + 10% and -10% or better than that |

- a. PCU shall confirm to IEC 60068-2 standards for Environmental Testing.
- b. All inverters shall be IEC 61000 compliant for electromagnetic compatibility, harmonics, etc.
- c. All inverters shall be safety rated as per IEC 62109 (1 &2), EN 50178 or equivalent DIN or UL standard.
- d. Each PCU shall be compliant with IEEE standard 929 – 200 or equivalent. The Bidder should select the inverter (Central / String) as per its own system design so as to optimize the power output.

xxiii. Display

- a. The PCU shall have local LCD (Liquid crystal display) and keypad for system control, monitoring instantaneous system data, event logs, data logs and changing set points. Control and read-out should be provided on an indicating panel integral to the Inverter.

Display should be simple and self-explanatory. Display to show all the relevant parameter relating to PCU operational data and fault condition in form of front panel meters/ LEDs or two line LCD Display.

- b. PCU front panel shall be provided with display (LCD or equivalent) to monitor the following
- Instantaneous DC power input
 - DC input voltage
 - DC Current
 - Instantaneous active AC power output
 - Instantaneous reactive AC power output
 - AC voltage (all the 3 phases and line)
 - AC current (all the 3 phases and line)
 - Power Factor
 - kWh Produced during entire day
 - Total kWh produced during its life time
 - Thermal loading (percentage)

PCU must be provided with display and also the same has to be made available at the SCADA monitoring & controlling desk installed in Main Control Room through Universal Open Protocol of Communication.

xxiv. Documentary Requirements & Inspection.

- a. The bill of materials associated with PCUs should be clearly indicated while delivering the equipment.
- b. The Contractor shall provide to GIPCL data sheet containing detailed technical specifications of all the inverters and PCUs. Operation & Maintenance manual should be furnished by the Bidder before dispatch of PCUs.

Note: The Owner or its authorized representative reserves the right to inspect the PCUs/ Inverters at the manufacturer's site prior to dispatch.

5.3.4 Cables and Wires

- i. All cables and connectors for use for installation of solar field must be of solar grade which can withstand harsh environment conditions, for 25 years and voltages as per latest IEC standards. (Note: IEC standards for DC cables for PV systems is under development, the

cables of 600- 1800 volts DC for outdoor installations should comply with the EN 50618 for service life expectancy of 25 years). **DC Cable of Positive & Negative must be colour coded as per EN50618.**

- ii. Wires with sufficient ampacity and parameters shall be designed and used so that average voltage-drop at full power from the PV modules to inverter should be **maximum 2%** (including diode voltage drop). All cables and connectors for use for installation of solar field must be of solar grade which can withstand harsh environment conditions including High temperatures, UV radiation, rain, humidity, dirt, burial and attack by rodents, moss and microbes for 25 years and voltages as per latest IEC standards. (Note: DC cables for outdoor installations should comply with the EN50618 / TUV 2PFG 1169/09.07 or equivalent IS for service life expectancy of 25 years). Due consideration shall be made for the de-rating of the cables with respect to the laying pattern in buried trenches / on cable trays, while sizing the cables. The Contractor shall provide voltage drop calculations in excel sheet.
- iii. All cables shall be supplied in the single largest length to restrict the straight-through joints to the minimum number. Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted. All wires used on the LT side shall conform to IS and should be of appropriate voltage grade. Copper conductor wires of reputed make shall be used. Armoured Aluminium cable connecting SMB and Inverter and also for LT applications are allowed.
- iv. Positive and Negative DC cables shall be laid in the separate trench and it should be with different colour.
- v. All cables shall be armoured except Solar Cables. Solar cable shall be laid through MMS / DWC Conduits.
- vi. Armoured OFC cable shall be laid in DWC conduits.
- vii. Armoured Ethernet cables shall be CAT-6.
- viii. All wires used for connecting the modules and array should conform to the NEC standards. Modules should be connected with USE-2/RHW-2 cables array to junction box conductors and junction box to photovoltaic disconnect with the THHN/THWN-2 sunlight resistant with 90°C wet rated insulation cable.
- ix. All high voltage cables connecting the main junction box/string inverters to the transformers should be XLPE insulated grade conforming to IS 7098-I and cables shall also conform to IEC 60189 for test and measuring the methods.
- x. Irrespective of utilization voltage and current rating all type of power cables shall be minimum of 1100 V/1500V grade XLPE insulated conforming to IS 7098& IS 1554/ IS 694

for working voltage less than 150 V control cable shall be of minimum 650 V grade, the control and power cable has to be laid separately. All LT XLPE cables shall confirm to IS: 7098 Part I & II. All HT XLPE Cables (up to 33kV) Shall confirm IS: 7098 PART-3 & IEC -60287, IEC-60332 and the Contractor to submit technical data sheet, Voltage drop calculation, Power Loss Calculation and type test report for the approval of client / consultants.

- xi. The cables shall be adequately insulated for the voltage required and shall be suitably colour coded for the required service. Bending radius for cables shall be as per manufacturer's recommendations and IS: 1255.

Table 5-3 Relevant Codes & Standards for Cable

| Sr. | Item | Relevant IS | Relevant IEC |
|-----|--|-------------------------|-------------------------------------|
| 1 | Conductors of Insulated Cables | IS: 8130 - 1984 | IEC: 228 |
| 2 | Impulse tests on cables and their accessories | | IEC: 230 |
| 3 | Extruded solid dielectric-insulated power cables for rated voltage from 1 KV upto 30 KV. | | IEC: 502 |
| 4 | Test methods for insulations and sheaths of electric cables and chords. | | IEC: 540 |
| 5 | Test on cable over a sheath which has special protective functions and are applied by extrusion. | | IEC: 229 |
| 6 | Calculations of continuous current rating of cables (100% load factor). | | IEC: 287 |
| 7 | Cross-linked polyethylene insulated PVC sheathed cable for voltage from 3.3 KV upto 33 KV. | IS: 7098 (Part II& III) | |
| 8 | PVC insulation & sheath of electrical cables. | IS: 5831 - 1984 | |
| 9 | Mild steel wires, formed wires and tapes for armouring of cables. | IS: 3975 | |
| 10 | Electrical test methods for electric cables partial discharge test. | | IEC: 885(2) - 1987 (Part II) |
| 11 | Methods of test for cables. | IS: 10810 | |

| | | |
|-----------|--|-----------------|
| 12 | Common test methods for insulating and sheathing materials of electric cables. | IEC: 811 |
| 13 | Impulse test on cables & other accessories | IEC: 230 |
| 14 | Cable termination for gas insulated switchgear. | IEC: 859 |

5.3.5 Technical Specification of LT XLPE Cables

General Constructional Features

The medium voltage cables shall be supplied, laid, connected, tested and commissioned in accordance with the drawings, specifications, relevant Indian Standards specifications, manufacturer's instructions. The cables shall be delivered at site in original drums with manufacturer's name, size, and type, clearly written on the drums.

A. Material:

Medium voltage cable shall be XLPE insulated. PVC sheathed, aluminium or copper conductor, armoured conforming to IS: 7098 Part I.

B. Type:

The cables shall be circular, multi core, annealed copper or aluminium conductor, XLPE insulated and PVC sheathed, armoured.

C. Conductor:

Uncoated, annealed copper, of high conductivity upto 4 mm² size, the conductor shall be solid and above 4 mm², conductors shall be concentrically stranded as per IEC: 228.

D. Insulation:

XLPE rated 90° C. extruded insulation.

E. Core Identification:

| | | |
|-------------|---|---|
| Two core | : | Red and Black |
| Three core | : | Red, Yellow and Blue |
| Four core | : | Red, Yellow, Blue and Black |
| Single core | : | Green cable with Yellow strips for earthing |

Black shall always be used for neutral.

F. Assembly:

Two, three or four insulated conductors shall be laid up, filled with non-hygroscopic material and covered with an additional layer of thermoplastic material.

G. Armour:

Galvanised steel flat strip / round wires applied helically in single layers complete with covering the assembly of cores.

- For AC cable Armour of non-magnetic 1.4 mm dia G.I. round wire
- For DC cable Armour of 4 mm wide 0.8 mm thick G.I strip

H. Sheath:

The cable shall be rated extruded for XLPE 90 deg.c. Inner sheath shall be extruded type and shall be compatible with the insulation provided for the cables.

Outer sheath shall be of an extruded type layer of suitable PVC material compatible with the specified ambient temp 50 deg. C and operating temperature of cables. The sheath shall be resistant to water, ultraviolet radiation, fungus, termite and rodent attacks. The colour of outer sheath shall be black. Sequential length marking required at every 1.0 meter interval on outer sheath shall be available. The contractor has to furnish resistance / reactance / capacitances of the cable in the technical datasheet.

I. Rating:

1100 Volts or higher.

5.3.6 Technical Specification of HT XLPE Cables

General Constructional Features

A. Conductors:

The conductor shall be of circular stranded Aluminium confirming to IS: 8130 & IEC: 228. It shall be clean, reasonably uniform in size & shape smooth & free from harmful defects. Any other form of conductor may also be accepted if in line with modern trends.

B. Semi-Conductor Barrier Tape/Tapes:

The semi-conducting barrier tape/tapes shall be provided over the conductors.

C. Conductor Screen:

The conductor screen shall consist of an extruded layer of thermosetting semi-conducting compound which shall be extruded simultaneously with the core insulation.

D. Insulation:

The insulation shall be super clean XLPE compound applied by extrusion and vulcanized to form a compact homogenous body.

E. Insulation Screen:

- a. Each insulation have an insulation screen in two parts consisting of:
- b. A water barrier tape/Non-metallic semi-conductive swellable tape part and a metallic screen part.
- c. The non-metallic part shall be directly applied upon the insulation of each core and may consist of an impregnated but nylon/PVC tape or a similar approved material or, an extruded semi-conducting material extruded simultaneously with the conductor screen and insulation (triple extrusion).
- d. The semi-conductor shall be readily strippable and must not be bonded in such a manner that it has to be shaved or scraped to remove.
- e. The metallic part shall consist of a copper tape helical applied with a 30% overlap over the water barrier tape/blocking tape as per IS 7098. A binder tape of copper shall be applied over the copper wire metallic screen.

F. Laying Up:

- a. The cores shall be identified on the non-metallic part of the insulation screen by legible printing on the length of each conductor or, by the inclusion of a marker tape.
- b. The cores shall be laid up with a right hand direction of lay.
- c. Binder tape/Moisture barrier:

During layup, a suitable open spiral binder may be applied, at the manufacturer's discretion, before the application of an extruded inner covering.

G. Fillers:

Fillers shall be polypropylene.

H. Inner Covering/Sheath:

The inner covering shall be extruded over the laid up cores to form compact and circular bedding for the metallic layer.

I. Metallic Layer:

The metallic layer shall be galvanised steel wire.

J. Outer Sheath:

The tough outer sheath, black coloured best resisting PVC polyethylene compound type ST-2 as per IS: 5831 for the operating temperature of the cable shall be provided over the armour as specified in relevant standards by extrusion process.

K. Cable Marking:

a. Embossing on outer sheath:

The following particulars shall be properly legible embossed on the cable sheath at the intervals of not exceeding one meter throughout the length of the cable. The cables with poor and illegible embossing shall be liable for rejection.

- GIPCL SPVPP
 - Voltage grade
 - Year of manufacture
 - Manufactures name
 - Successive Length
 - Size of cable
 - ISI mark
- xii. Packing and marking shall be as per clause No. 18 of IS 7098 (part I)/1988 amended up to date.
- xiii. Cables inside the control room and in the switchyard shall be laid in Galvanized Cable Trays mounted on mild steel supports duly painted, in constructed trenches with RCC raft and brick sidewalls and provided with removable RCC covers.
- xiv. Cable terminations shall be made with suitable cable lugs & sockets etc, crimped properly and passed through brass compression type cable glands at the entry & exit point of the cubicles.
- xv. All cable/wires shall be provided with Punched Aluminium tags only. The marking on tags shall be done with good quality letter and number ferrules of proper sizes so that the cables can be identified easily.
- xvi. The wiring for modules interconnection shall be in the GI pipe /HDPE/ DWC Pipe of approved make.
- xvii. Data sheets of individual cable sizes (HT & LT) shall be submitted for approval by the Owner. Drum numbers and drum length details shall be submitted with each consignment.
- xviii. Cable end terminations and joint kits shall comply with the latest version of the relevant IS standard.
- xix. The cable ends shall be terminated with adequate size copper/ Aluminum/ Bimetallic lugs and sockets etc, single/double compression cable glands. Cable glands shall be of robust construction capable of clamping cable and cable armor (for armored cables) firmly without injury to insulation. The metallic glands shall be earthed at min one location. Suitable lock

type crimping lugs shall be used for cable end terminations. Where cables are raising from ground, suitable PVC pipe guarding shall be provided for cable raising with sealing of the guarding PVC pipe including a suitable clamp.

- xx. HT cable termination kits and straight through joints shall be selected as per the cable specifications. Installation shall be as per the instructions given in the manufacturer's manual. Heat shrinkable type kits only shall be used for HT and LT cables.
- xxi. Data sheets of the joints and kits shall be submitted for approval by GIPCL.

5.3.7 Clamps and Connectors

- i. The bus-support clamps, spacers, T-connectors and various equipment connectors shall be supplied as per the enclosed drawings. The material to be used for these items shall be generally as per the Table 5-4.
- ii. The materials shall be of the best workmanship, and all the sharp edges and corners shall be rounded off. The thickness of tinning, wherever applicable, shall be not less than 10 microns. The minimum thickness of pads made of copper shall be 10 mm and those made out of Aluminium/Aluminium Alloy, shall be 12 mm, unless otherwise indicated in the specifications.
- iii. All the clamps and connectors shall be designed to carry a continuous current not less than 125% of the rated current of the conductor (twin/single as the case may be)/equipment terminal to which these are to be connected. Temperature rise of the connector under the above condition shall not be more than 50% of the temperature of the main conductor/equipment terminal.

Table 5-4 Clamps & Connectors

| Sr. | Application | Material |
|-----|--|--|
| 1. | Bolted type connection | |
| 2. | For connection to ACSR/AAAC/ Aluminum terminal | Aluminum Alloy conforming to designate A6 as per IS 617 |
| 3. | For connection to copper terminals, with crimping facility to connect ACSR/AAAC jumper | Electrolytic grade copper, forged and tinned |

4. Crimping type connection

5. For connection to ACSR/AAAC jumper

Electrolytic grade aluminum

- iv. All the fasteners (i.e. nut-bolts, washers, check-nuts, etc.) used in the clamps and connectors shall be of non-magnetic stainless steel. The straight bolts shall be fully threaded, and the U-bolts shall be threaded up to 30 mm from the ends. For connectors made out of Aluminium/Aluminium Alloy, the bolts shall be of 12 mm diameter, and for copper connectors the bolts shall be of 10 mm diameter.
- v. The clamps and connectors meant for ACSR and AAAC shall have the same crimping dimensions. It shall be possible to use the same clamp/connector for ACSR or AAAC, as would be required, without any modification/change at site.
- vi. The length of bolt shall be chosen such that after fully tightening the nut and check-nut, minimum 5 (five) threads of the bolt shall project outside the nut/check-nut.
- vii. As an alternative to the various types of clamps and connectors detailed under 2.0 above, the Contractors may offer connectors of **Power Fired Wedge Pressure Technology (PFWPT)**. However, the same needs to be specified in the Bid.
- viii. Connectors of PFWPT type shall meet the general requirements for various connections/joints as indicated in the relevant drawings.
- ix. PFWPT type connectors shall comprise of:
 - a. Tapered 'C' - shaped spring member
 - b. Wedge for connecting solid/stranded conductor along with handle, suitable for connection between:
 - Aluminium & Aluminium
 - Copper & Copper
 - Aluminium & Copper
 - Aluminium & Al. Alloy
 - Copper & Al. Alloy
 - Al. Alloy & Al. Alloy
 - i. Components of the PFWPT type connectors shall be made of Aluminium Alloy suitably heat-treated to ensure that the required Mechanical & Electrical parameters are in line with ANS 1 specification no. C 119.4-1991. The connectors shall have 'self-cleaning' capability

during application. The connector shall ensure stable and low contact resistance under varying load conditions and the thermal cycling effects.

- ii. The special tools and tackles required for installation of the PFWPT type connectors shall be identified in the offer. One set of these bolts and tackles shall be included in the scope of supply.
- iii. The Contractor shall furnish the following information in their bill of material:
 - a. Availability of the PGWT connectors indigenously.
 - b. Unit rate of each item
 - c. Notwithstanding anything stated above, the final decision regarding acceptance of the type of clamps and connectors (conventional/PFWPT type) shall rest with GIPCL

5.3.8 Structural Steel Work

- i. The structural steelwork required for termination incoming 33/66/220 kV line/ Cable, equipment supports, lighting masts and for shielding towers together with all foundation bolts shall be included by the Bidder in its scope of work. The steel work shall be fabricated from galvanized structural sections. The height of structures for incoming line shall be as per the design developed by the Bidder and drawings submitted.
- ii. The incoming line gantry shall be designed on the basis of ACSR conductor/Cable considered in the design and also considering that GETCO terminal tower will be located at a distance of not more than 100 meters from the incoming gantry at SPV power station switchyard. The Bidder shall take into account wind load, temperature variation etc. while designing the gantry structure. The column shall be provided with step bolts and anti-climbing devices.
- iii. The entire structural steel work shall conform to IS: 802. The Bidder shall furnish design calculations for approval by Owner before procuring the material.
- iv. The design of the switchyard towers, gantries and equipment structures shall also be designed in conformity with the standards followed by the Owner. Approval from the Owner also shall be obtained by the Bidder if required.

5.3.9 Hardware

- i. Metal fittings of specified material for string hardware meant for power conductor and earth wire shall have excellent mechanical properties such as strength, toughness and high corrosion resistance. The suspension and tension clamps shall be made from aluminum alloy having high mechanical strength. Suspension and tension clamps offered shall be suitable for ACSR / AAAC conductor as per design.
- ii. All hooks, eyes, pins, bolts, suspension clamps and other fittings for attaching insulators to the tower or to the power conductor shall be so designed as to reduce (to a minimum) the damage to the conductor, insulator or the fitting arising from conductor vibration.
- iii. All drop-forged parts shall be free-from flaws, cracks, or other defects and shall be smooth, close-grained and of true forms and dimensions. all machined surfaces shall be true, smooth and well-finished. The thickness of galvanization of all structural steel of Switchyard shall be minimum 85 microns measured at all points of the structure member when measured. No averaging is allowed. The gap between base plate of structural members and concrete top of foundation shall be filled with GP-2 grouting material of reputed make. The material of all J-bolts shall be of 8.8 Class.
- iv. All ferrous parts of hardware shall be galvanized in accordance with IS 2629. The galvanization shall withstand four dips of 1-minute duration each in copper-sulphate solution as per the test procedure laid down in the relevant ISS.
- v. The threads in nuts and tapped holes shall be cut after galvanizing, and shall be well-lubricated/greased. All other threads shall be cut before galvanizing.
- vi. Both the suspension and the tension hardware shall be of ball and socket type, and shall be with 'R' and 'W' type security clip of stainless steel or phosphor Bronze conforming to IS 2486. The tension clamps of both compression type and bolted type as shown in the relevant drawings shall be offered. Arcing horns shall be provided on the line side for both the suspension type and compression type hardware.

a. Danger Plates

- vii. Size of each Danger Notice plates shall be 200 mm x 150 mm made of mild steel sheet and at least 2 mm thick, and vitreous enameled white on both sides and with inscription in signal red colors on front side as required. The inscriptions shall be in Gujarati and English.
- viii. Fire Extinguishing System.
- ix. The installation shall meet all applicable statutory requirements, safety regulations in terms of fire protection.
- x. Liquefied CO₂ fire extinguisher shall be upright type of capacity 10 kg having IS: 2171. 7 IS: 10658 marked. 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. Bidder shall provide portable fire extinguisher as given below:

| DCP Type (ABC type) (10 kg Cap) | CO ₂ Type Hand 9 kg | Foam Type Hand 9 kg |
|------------------------------------|-----------------------------------|------------------------|
| 1 | 1 | 1 |

- xi. The minimum 1 no. of fire extinguishers shall be required for each inverter rooms and as per CEA and safety guidelines required numbers of fire extinguisher shall be kept at switchyard and control room. For outdoor installations type AB fire extinguishers can be used and for all indoor applications type ABC fire extinguishers shall be used.
- xii. Sand bucket should be wall mounted made from at least 24 SWG sheet with bracket fixing on wall conforming to IS 2546.

5.3.10 Lightning Protection for PV Array

- i. The source of over voltage can be lightning or other atmospheric disturbance. Main aim of over voltage protection is to reduce the over voltage to a tolerable level before it reaches the PV or other sub-system components as per IEC 60099, IS: 2309 – 1989 (Reaffirmed – 2005), Edition 3.1 (2006-01).
- ii. Necessary foundation / anchoring for holding the lightning conductor in position to be made after giving due consideration to shadow on PV array, maximum wind speed and maintenance requirement at site in future. Lightning arresters shall be equipped with lightning counters.
- iii. The lightning conductor shall be earthed through flats and connected to the earth mats as per applicable Indian Standards with earth pits. Minimum two earth pits shall be provided for

each lightening arrestor. Each lightning conductor shall be fitted with individual earth pit as per required Standards including accessories, and providing masonry enclosure with cast iron cover plate having locking arrangement, watering pipe using charcoal or coke and salt as required as per provisions of IS & Earth Resistance of Lightening System must be less than one (1) Ohm.

- a. If necessary more numbers of lightning conductors may be provided. The Contractor is also free to provide franklin rod / Early Streamer type of lightning arrestors on the MMS structure designed in such a way not to cast shadow on the next raw of solar PV modules. The Contractor to submit necessary calculations based upon rolling sphere method for the Lightening protection system.
- iv. The Contractor shall submit the drawings and detailed specifications of the PV array lightning protection equipment to GIPCL for approval before installation of system.

5.3.11 AC Network

- i. AC converted by the inverter is transmitted through the appropriate cables from the Inverter to appropriately sized Inverter transformer. In case of more than one Inverter transformer in a block, ICOG/RMU (Breakers for each transformer + one outgoing breaker) shall be provided. Each individual block shall be connected to Switchyard Block at MCR through underground AC cable or overhead transmission line or combination of both. RMU panel should consist of adequate size indoor AC bus/ cable, which can handle the normal & fault current (1 sec) and the voltage safely as per the relevant, IS standards. RMU panel should be equipped with adequate protection relays, fuses, annunciations, power pack (for ICOG/ RMU control supply) with rectifier unit and minimum 30 minute battery back up (Input: 230V AC, Output: 110V DC, 1 Amp with adequate continuos and impulse load rating) and remote operating and controlling facility from the Main Control Room. Relevant national & international codes to be follows :-

Table 5-5 Relevant National & International Code for Power Transformer

| Sr. | Item | Relevant IS | Relevant IEC |
|-----|------------------------|-------------|------------------|
| 1 | Power transformer | IS 2026 | IEC 60076 |
| 2 | Fittings & Accessories | IS 3639 | |
| 3 | Climate Proofing | IS 3202 | IEC 354 |
| 4 | Loading of Transformer | IS 6600 | IEC 296 |
| 5 | Oil | IS 335 | IEC 137 |



| | | | |
|-----------|---|----------|----------------|
| 6 | Bushings | IS 20650 | IEC 144 |
| 7 | Degree of Protection | IS 2147 | IEC 76 |
| 8 | Testing, Tolerances on guaranteed Particulars | IS 2026 | IEC 76 |
| 9 | Buchholz Relay | IS 3637 | |
| 10 | Electrical Insulation | IS 1271 | IEC 85 |

- ii. ICOG/RMU panel or radial scheme through VCB panel is acceptable but ICOG/RMU is to be used for connecting inverter room and main control room. It shall have circuit breaker of suitable rating for connection and disconnection of PCU from grid. It shall have provision to measure bus voltage, current and power of the transformer using multifunction meter of reputed make with minimum accuracy of 0.2. Associated CT & PT shall also be of same accuracy class. . Outdoor inverter & ICOG/RMU panel with IP65 or above are acceptable. Interconnection of ICOG/ RMU to Inverter duty transformer and ICOG to indoor pooling switchgear shall be through HT cables. Inverter station should be properly provided with canopy structure and working platform.
- iii. Bus-bars shall be of high conductivity Aluminium alloy or Copper of adequate size. The bus-bars shall be adequately supported by non-hygroscopic, non-combustible track resistant and high strength type polyester fibre glass moulded insulators. Separate supports shall be provided for each phase and neutral bus bar. The bus-bars joints shall be provided with high tensile steel bolts, Belleville washers and nuts, so as to ensure good contacts at the joints. The bus-bars shall be colour coded as per IS 375.
- iv. The Bidder shall submit the detailed specifications of the AC bus and panel in the Bid.
- v. The ICOG/RMU panel with suitable numeric relay for overcurrent and earthfault protection. The incomer shall be selected one size higher than the required rating as per Type 2 selection chart. ICOG/RMU shall be provided with multifunction metering facility i.e. ampere voltage power, power factor etc. irrespective of voltage presence indications. Annunciator with RS485 port for connectivity with SCADA and Surge arrester of required specifications shall also be provided in the ICOG/ RMU.
- vi. Removable gland plates with gaskets shall be provided in the cable alleys for glanding the power and control cables. The distance between the gland plate and the incomer terminals shall not be less than 450 mm.
- vii. The Contractor should submit theoretical design calculations and detailed explanations along with drawings shall be provided and approved by the Owner.

33/66/220 kV HV SUBSTATION BLOCK/ SWITCHYARD & OVERHEAD LINE:

GENERAL INFORMATION

This specification intends to cover the following activities, services and work in respect of Switchyard & Overhead (O/H) lines.

- a. Complete design and engineering of all the systems, sub-systems, equipment, material and services.
- b. Providing engineering data, drawings and O&M manuals for Employer's review, approval and records.
- c. Manufacturing, supply, testing, packing, transportation and insurance from the manufacturer's work to the site including port and customs clearance, if required.
- d. Receipt, storage, insurance, preservation and conservation of equipment at the site.
- e. All civil works as required.
- f. Fabrication, pre-assembly (if any), erection, testing and putting into satisfactory operation of all the equipment/material including successful commissioning.
- g. Furnishing of spares on FOR site basis.
- h. Reconciliation with customs authorities, in case of foreign supplies.
- i. Satisfactory completion of the system

In addition to the requirements indicated in this section (Technical specifications), all the requirements as stated in other sections shall also be considered as a part of this specification as if completely bound herewith.

The Bidder shall be responsible for providing all material, equipment and services specified or otherwise which are required to fulfill the intent of ensuring operability, maintainability and the reliability of the complete work covered under this specification. The systems, sub-systems and equipment shall conform in all respect to high standards of engineering, design and workmanship, and shall be capable of performing in continuous commercial operation.

The scope of work comprises of Power evacuation of the proposed Solar PV project at the identified Substation (as per interconnection point/metering point mentioned).

The scope of work shall comprise, but not limited to the design, engineering, manufacture, testing and inspection at manufacturer's works, packing, supply, transportation, transit



insurance, delivery to site, unloading, storage and equipment erection, associated civil and structural works. Further, it shall include cabling, lighting, lightning protection, earthing, association of sub vendors if any in the erection, supervision, site testing, inspection and commissioning of Switchyard & O/H/Underground lines.

5.3.12 Step-Up Transformer

- i. The Contractor shall provide the complete EPC design, supply, erection, testing and commissioning of transformers and transformer substation to first step-up the output of the inverter to HV at the location of the inverter. Inverter Transformer must be protected with HV VCB Panel / RMU/ ICOG Capacity of each inverter block. Capacity of -ICR (Inverter Block) shall not exceed more than 12.5 MW. Hence, total 75 MW (AC) capacity of the solar plant with provision of rated 33 kV HV Vacuum Circuit Breaker panel shall be connected upto 33/66/220 kV substation (Switchyard) of the plant.
 - ii. 3 phase, Oil Filled, 33 kV, 50 Hz, Inverter Transformers of the selected inverter rating and associated Switchgear of approved make should be utilized as per IS 6600. Inverter transformers can be off-load tap change type. The transformers shall be suitable for outdoor installation in which the neutral grounding shall be as per system requirement. The transformers should be suitable for service under fluctuations in supply voltage up to plus 5% to minus 10% in step of 2.5% for inverter transformer.
 - iii. 75 MW (AC) plant shall have power transformer(s), with ONAF cooling. The temperature rise of top oil (by thermometer method) shall not exceed 50°C over an ambient temperature of 50°C and Temperature rise of winding (by resistance method) shall not exceed 55°C over an ambient temperature of 50°C,
 - iv. Cumulative loss shall be as per IGBC / CBIP guidelines. All electrical equipment and installation shall confirm to the latest Indian Electricity Rules as regards safety, earthing and other essential provisions specified for installation and operation of electrical plants.
 - v. Relevant national and international standards in this connection are mentioned in Table 5-6
- General Standards for Transformers

The equipment to be furnished under this specification shall be in accordance with the applicable section of the latest version of the following Indian Standards, IEC publications

and any other standards of latest edition including amendments, except where modified and /or supplemented by this specification.

- a) IS 12463 :Inhibited mineral insulating oil
- b) IS 2026 :Specification for Power Transformers (All parts)
- c) IS 2099 :Specification For Bushings for Alternating voltages above 1000V
- d) IS 3347 :Dimension for porcelain transformer bushings
- e) IS 3639 :Specification For Fittings and accessories for Power Transformers
- f) IS 4257 :Porcelain Bushings for Transformers
- g) IS 6600 :Guide For Loading Of Oil Immersed Transformers
- h) IS 10028 : Code of practice for selection, installation and maintenance of transformers.
- i) IS-2705 : Specification for Current Transformers
- j) IS 8478 : Application Guide for On Load Tap changers.
- k) IS 10561 : Application Guide for Power Transformers.
- l) IS 1893 : Criteria for earthquake resistant design of structures.
- m) IS 5 : Painting
- n) IEC 60076 : Power Transformers (All parts)
- o) CBIP Manual on Transformers
- p) Indian Electricity Act and rules framed there-under.
- q) Regulations laid by the office of the Chief Electrical Inspector to Government.
- r) Standard Specifications and Technical Parameters for Transformers and Reactors (66 kV & above Voltage Class)

vi. .

- vii. All working parts, insofar as possible, are to be arranged for convenience of operation, inspection, lubrication and ease of replacement with minimum downtime. All parts of equipment or of duplicate equipment offered shall be interchangeable.
- viii. The quality of materials of construction and the workmanship of the finished products/ components shall be in accordance with the highest standard and practices adopted for the equipment covered by the specification.

Table 5-6 General Standards for Transformers

The equipment to be furnished under this specification shall be in accordance with the applicable section of the latest version of the following Indian Standards, IEC publications and any other standards of latest edition including amendments, except where modified and /or supplemented by this specification.

- s) IS 12463 :Inhibited mineral insulating oil
 - t) IS 2026 :Specification for Power Transformers (All parts)
 - u) IS 2099 :Specification For Bushings for Alternating voltages above 1000V
 - v) IS 3347 :Dimension for porcelain transformer bushings
 - w) IS 3639 :Specification For Fittings and accessories for Power Transformers
 - x) IS 4257 :Porcelain Bushings for Transformers
 - y) IS 6600 :Guide For Loading Of Oil Immersed Transformers
 - z) IS 10028 : Code of practice for selection, installation and maintenance of transformers.
 - aa) IS-2705 : Specification for Current Transformers
 - bb) IS 8478 : Application Guide for On Load Tap changers.
 - cc) IS 10561 : Application Guide for Power Transformers.
 - dd) IS 1893 : Criteria for earthquake resistant design of structures.
 - ee) IS 5 : Painting
 - ff) IEC 60076 : Power Transformers (All parts)
 - gg) CBIP Manual on Transformers
 - hh) Indian Electricity Act and rules framed there-under.
 - ii) Regulations laid by the office of the Chief Electrical Inspector to Government.
 - jj) Standard Specifications and Technical Parameters for Transformers and Reactors (66 kV & above Voltage Class)
- ix. All items of equipment and materials shall be thoroughly cleaned and painted in accordance with relevant Indian Standards. The finish paint shall be done with two coats of epoxy based final paint of colour Shade **RAL 7035** of IS:5 for indoor equipment
- x. Any fitting or accessories which may not have been specifically mentioned in the specification but which are usual or necessary in the equipment of similar plant or for

efficient working of the plant shall be deemed to be included in the contract and shall be provided by the Contractor without extra charges. All plant and apparatus shall be complete in all details whether such details are mentioned in the specifications or not.

- xi. All equipment shall be designed for operation in tropical humid climate at the required capacity in an ambient air temperature of 50°C. Equipment shall be suitable for an ambient temperature of 50°C. Maximum relative humidity of 100% shall also be taken into consideration for design of equipment.
- xii. The reference ambient temperatures for which the transformers are to be designed are as mentioned in Table 5-7.
- xiii. The rating and electrical characteristics of the Outdoor type inverter transformer (typical) shall be as mentioned in Table 5-8

Table 5-7 Reference Weather Conditions for Transformer Design

| Sr. | Particulars | Specifications |
|-----|---|--|
| 1. | Maximum ambient temperature | 50 degree C |
| 2. | Maximum daily average ambient temp | 45 degree C |
| 3. | Maximum yearly weighted average ambient temp | 40 degree C |
| 4. | Minimum ambient air temperature: (Cooling medium shall be Air) | Minus 5 degreeC |
| 5. | Climatic Conditions : | |
| 5.1 | Maximum relative humidity | 100% |
| 5.2 | Yearly average number of thunder storms | Varies from 30 to 50 |
| 5.3 | Average no. of rainy days per annum | 60 days |
| 5.4 | Fog | The atmosphere is subject to fog for two month in winter |
| 5.5 | Number of months during which tropical monsoon conditions prevail | 3 months |
| 5.6 | Dust storms | occur at frequent intervals |
| 5.7 | Average annual rainfall | 60 cms |
| 5.8 | Maximum wind speed | 180 kmph |

5.3.13 Technical Data of Inverter Transformer

5.3.13.1 The rating and electrical characteristics of the outdoor type inverter transformer (typical) shall be as under:

Table 5-8 Rating and electrical characteristics of Inverter Transformer

| Sr. | Particulars | Inverter Transformer (Outdoor type) |
|-----|--|--|
| 1 | Continuous kVA ratings and quantity | As per System Requirement |
| 2 | Voltage Ratio | As per System Requirement |
| 3 | Duty, Service & Application | Continuos Solar Inverter application and converter duty (Outdoor) |
| 4 | Type | Oil immersed |
| 5 | Windings | As per system requirement |
| 6 | Frequency | 50 Hz |
| 7 | Type of cooling | Oil Natural Air Natural |
| 8 | No. of phases | Three |
| 9 | Rating voltage H.V. side | 33 kV |
| 10 | Highest System voltage on H.V. side | 36 kV |
| 11 | Rated voltage on L.V. side | Output of solar inverter |
| 12 | Vector Group and Neutral Earthing | As per system requirement |
| 13 | Cooling | ONAN |
| 14 | Tap Changer on H.V. Side (for H.V. Variation) | + 5 to – 10.0 % (in steps of 2.5%) |
| 15 | Impedance voltage (%) as per IS 2026 at Principal Tap and other Taps | As per System requirement & as per Inverter manufacturer recommendation if any |
| 16 | Minimum Creepage distance | 31mm/ kV |
| 17 | Transformer connections | LV side – Bus Duct/ Busbar with weather proof enclosure, HV Side –Bushing with enclosure |

| | | |
|-----------|---|--|
| 18 | Permissible Temp. rise over ambient of 50 Deg C (irrespective of tap) (a) Top oil (b) Winding | (a) 50 Deg C (b) 55 Deg C |
| 19 | Short circuit withstand time (thermal) | 2 sec |
| 20 | Fault level & bushing CT | As per system requirement |
| 21 | Bushing rating, Insulation class (Winding & Bushing) | As per relevant IS/IEC |
| 22 | Noise level | As per NIMA TR-1 |
| 23 | Loading capability | Continuous operation at rated MVA on any tap with variation of +/-10%, transformer shall be capable of being loaded in accordance with IS:6600/IEC60076-7 |
| 24 | Flux Density | Not to exceed 1.9 Wb/Sq.m. at any tap position with +/-10% voltage variation. Transformer shall be able to withstand combined voltage & frequency fluctuations: (a) 110% continuously (b) 125% for at least one minute (c) 140% for at least 5 seconds. Bidder shall furnish overfluxing characteristic up to 150% |
| 25 | Air clearance | As per CBIP/ CEA regulation |

Option –I: In case of Power Evacuation to 66kV Mosali GETCO SS

General

- Outdoor air insulated sub-station or switchyard shall be shielded against direct lightning stroke by provision of overhead shield wire or earthwire or spikes (masts) or a combination thereof.
- In case of AIS, bus-bars shall be either of the rigid type with tubular aluminium bus conductor or flexible stranded conductor with aluminium conductor steel reinforced (ACSR) or all aluminium alloy conductor (AAAC) or other suitable conductors. The conductor of appropriate rating and the number of conductors to be used in case of bundle conductors shall be selected considering power flow requirements and ambient

conditions. For the rigid bus-bar arrangement, aluminium pipes conforming to relevant standard shall be used.

3. Grounding system for the entire switchyard, equipment and buildings shall be provided in accordance with relevant IS/ IEEE.
4. The touch and step potential limits shall be maintained within acceptable limits as per relevant IS/ IEEE standards.
5. The use of environmentally friendly earthing enhancing compound / material may also be considered, wherever soil resistivity is very high, to achieve the objective of effective grounding system
6. The switchyard or sub-station layout shall be decided with due consideration to statutory safety requirements, ease of erection and maintenance, etc. Safety clearances shall be maintained in accordance with the Central Electricity Authority (Measures relating to Safety and Electricity Supply) Regulations. The clearances shall be adequate for moving portable equipment for maintenance and maneuvering personnel for carrying out maintenance. Clearances from adjacent live parts shall be maintained for safety.”.

66/33 kV transformer bays at North & South plots shall consist of following equipments

1. Lightning Arrester
 - Station class, heavy duty, gapless metal oxide (ZnO) type surge arresters shall comply to relevant IS/IEC standards.
 - The rated voltage, continuous operating voltage (COV), energy handling capability, nominal discharge current and other characteristics of a surge arrester shall be chosen in accordance with power system requirements.
 - Surge arresters shall be provided at locations decided in accordance with insulation coordination studies.
 - These shall be fitted with pressure relief devices and diverting ports suitable for preventing shattering of porcelain housing providing path for the flow of rated currents in the event of failure of surge arrester.
 - Arrester with composite insulator housing with sufficient cantilever strength is also acceptable to prevent shattering during arrester failure.
 - A leakage current monitor with surge counter shall be provided with each surge arrester
2. Wave Traps/ Line Trap (Applicable only if PLCC is required)



- Wherever Power Line Carrier Communication (PLCC) has been provided, the line trap shall be used complying with the relevant IS/IEC standards.
- Line trap shall consist of a main coil in the form of an inductor, a tuning device and a protective device and in conjunction with a coupling capacitor, it shall form a parallel resonant circuit.
- The tuning device shall be so arranged as to permit replacement without removing the line trap.
- The tuning as well as protective device shall be so designed that neither significant alteration in the line trap blocking requirements/protective function nor physical damage shall result from either temperature rise or the magnetic field of the main coil at rated continuous current or rated short time current.

3. Electromagnetic/ Capacitance Voltage Transformer

- Voltage transformers shall comply with the relevant IS/IEC standards.
- The number of secondary cores, accuracy class and burden shall be in accordance with the requirements of the protection and metering system.
- The rated burden of VT cores shall be closer to the maximum burden requirement of metering & protection system for better sensitivity & accuracy and it shall not exceed 50VA.
- The accuracy class for metering core shall be equal to or better than the accuracy class of the meter specified in the Central Electricity Authority (Installation and Operation of Meters) Regulations.
- Voltage transformers can be either electromagnetic type or capacitive type. Wherever PLCC is provided, capacitor type voltage transformers (CVT) complying with relevant standards shall be used as the same are suitable for carrier coupling. The capacitance of CVT shall be decided depending on PLCC requirements. CVT option is applicable only if PLCC is required.

4. Current Transformer

- Current transformers shall comply with the relevant IS/IEC standards.
- The rated currents and ratio, the number of secondary cores, accuracy class, burden, secondary winding resistance, knee point voltage end excitation current shall be in accordance with the requirements of the protection and metering system.

- The rated burden of cores shall be closer to the maximum burden requirement of metering & protection system for better sensitivity and accuracy.
- Instrument Security factor (ISF) shall be less than 5 for CTs upto 400kV voltage class.
- The accuracy class for metering core shall be equal to or better than the accuracy class of the meter specified in the Central Electricity Authority (Installation and Operation of Meters) Regulations.

5. 66 KV breaker

- Circuit breakers shall comply with relevant IS/IEC standards.
- The interrupting medium of circuit breakers shall be SF6.
- Rupturing/ breaking capacity of 66kV breaker shall be 31.5kA (for 1 sec) or shall be at least 25% higher than calculated maximum fault level based on system study during detailed engineering.
- The circuit breaker shall have the provision for local manual trip which shall be at a position easily accessible to the operating person.
- Maximum rated break time for circuit breakers shall be 100 ms
- The circuit breaker shall be of class M2 with regard to mechanical endurance as per IEC Standard

6. 66kV Isolators/ disconnectors and earthing switches

- The disconnectors and earthing switches shall comply with relevant IS/ IEC standards.
- In AIS, main blades and earth blades shall be interlocked with both electrical and mechanical means, which shall be fail-safe.
- AIS type disconnectors shall have provision for remote and local operation.
- Disconnectors shall be suitable for Bus Transfer Current Switching duty as per IEC Standard if transfer scheme is applicable.
- Earthing switches shall be suitable for manual operation. Only local operation is recommended for earth switches

7. Insulators

- Porcelain, Glass or composite type insulators complying with the relevant IS/ IEC standards shall be used.

- The minimum specific creepage distances of insulators shall be 31 mm/kV line to line voltage considering very heavy pollution area.
8. 66kV control & relay panel
- Numerical relays shall be used for transformer differential, overcurrent earth fault or anyother protection.
 - Auxilary relays shall be used for alarm & trippings from all the field devices i.e. Buchholz, OLTC surge, PRD, Winding & Oil Temperatures, MOG etc.
 - Master trip relay shall be provided with trip circuit supervision
 - Other specifications as per Contol and Relay panel specifications mentioned at 5.3.23
9. Communication System
- Suply, installation and commissioning of total solar power communication system (data, speech, voice, teleprotection, telemetering etc.) as per requirement of concerned authorities i.e. GETCO/STU/DISCOM etc. shall be in bidder's scope.
 - Required equipment for communication system i.e. PLCC, OPGW, OFC, RTU, networking components/ equipment, panels, power supply, cables, FOTE panel etc. are in bidder's scope.
 - Required PMU (Phasor Measurement Unit) and its integration shall be in bidder's scope.
10. 66/33 kV Step Up Power Transformer

Technical Data Sheet of or 66/33kV Step UP Power Transformer

| Sr. | Particulars | 66/ 33 kV Step UP Power Transformer |
|-----|-------------------------------------|--|
| 1 | Type of transformer | ONAF cooled, Three phase, 66/ 33KV Step Up Power Transformer, Two winding, Core type for OUT DOOR application. Mounted on Rails with wheels. |
| 2 | Three phase type of windings for HV | Interleaved type / Disc type with static end rings at both ends with uniformly insulated |
| 3 | Three phase type of windings for LV | Continuous disc type / layer type with uniformly insulated. |
| 4 | Vector Grouping | D-Y n 11 / YNyn0 (as per IS: 2026 part-IV) or as per Design |
| 5 | Type of insulation | Uniformly insulated as per IS: 2026 Part III |

| | | |
|----|--|--|
| 6 | Winding Material | Electrolytic grade copper |
| 7 | Winding Insulation | Class-A |
| 8 | System frequency | 50Hz \pm 3% |
| 9 | Rated Capacity | As per IS 6600 for Power Transformer |
| 10 | Rated Primary Voltage | 33 kV |
| 11 | Rated Secondary Voltage | 66 kV |
| 12 | Maximum value of percentage Impedance at the (Normal working) principle tap position at 36 /60 MVA&/ or 18/30 MVA ONAF | 11.76% or As per IS without positive tolerance |

Non-cumulative over load capacity after the transformer has reached steady temperature on continuous operation at rated load i.e. At rated power) 110% for continuous, 125% for 15 minute, 140% for 5 min Tapings (On load Tap Changer) OLTC shall be of minimum 72 KV Voltage class and shall have maximum rated through current not less than 300 Amps at normal tap, short circuit withstand current not less than 8kA for 3 Seconds and shall be of High Speed Resistor type, housed in a separate tank.: Min.17 Taps in step of 1.25%. The maximum losses during ONAF condition to be considered for the evaluation and the same must be as per latest IS.

Option-II: Power Evacuation from SLPP 220KV switchyard

Installation of additional 220KV AIS Bay and 33kV AIS switchgear at SLPP 220KV switchyard

General:

1. Outdoor air insulated sub-station or switchyard shall be shielded against direct lightning stroke by provision of overhead shield wire or earthwire or spikes (masts) or a combination thereof.
2. In case of AIS, bus-bars shall be either of the rigid type with tubular aluminium bus conductor or flexible stranded conductor with aluminium conductor steel reinforced (ACSR) or all aluminium alloy conductor (AAAC) or other suitable conductors. The conductor of appropriate rating and the number of conductors to be used in case of bundle conductors shall be selected considering power flow requirements and ambient conditions. For the rigid bus-bar arrangement, aluminium pipes conforming to relevant standard shall be used.

3. Grounding system for the entire switchyard, equipment and buildings shall be provided in accordance with relevant IS/ IEEE.
4. The touch and step potential limits shall be maintained within acceptable limits as per relevant IS/ IEEE standards.
5. The use of environmentally friendly earthing enhancing compound / material may also be considered, wherever soil resistivity is very high, to achieve the objective of effective grounding system
6. The switchyard or sub-station layout shall be decided with due consideration to statutory safety requirements, ease of erection and maintenance, etc. Safety clearances shall be maintained in accordance with the Central Electricity Authority (Measures relating to Safety and Electricity Supply) Regulations. The clearances shall be adequate for moving portable equipment for maintenance and maneuvering personnel for carrying out maintenance. Clearances from adjacent live parts shall be maintained for safety.”.

220kV bay shall consist of following equipment

1. Lightning Arrester

- Station class, heavy duty, gapless metal oxide (ZnO) type surge arresters shall comply to relevant IS/IEC standards.
- The rated voltage, continuous operating voltage (COV), energy handling capability, nominal discharge current and other characteristics of a surge arrester shall be chosen in accordance with power system requirements.
- Surge arresters shall be provided at locations decided in accordance with insulation coordination studies.
- These shall be fitted with pressure relief devices and diverting ports suitable for preventing shattering of porcelain housing providing path for the flow of rated currents in the event of failure of surge arrester.
- Arrester with composite insulator housing with sufficient cantilever strength is also acceptable to prevent shattering during arrester failure.
- A leakage current monitor with surge counter shall be provided with each surge arrester

2. Communication System

- Total solar power communication system requirement (data, speech, voice, teleprotection, telemetering) shall be integrated seamlessly with existing



communication system (e.g. PLCC, OPGW, OFC, RTU etc.) of 220 kV switchyard.

- Required upgradation in existing communication system and/ or additional equipments, networking components/ equipment, panels, power supply etc. is in scope of bidder.
- Required PMU (Phaser Measurement Unit) and its integration shall be in bidder's scope.

3. Electromagnetic Voltage Transformer

- Voltage transformers shall comply with the relevant IS/IEC standards.
- The number of secondary cores, accuracy class and burden shall be in accordance with the requirements of the protection and metering system.
- The rated burden of VT cores shall be closer to the maximum burden requirement of metering & protection system for better sensitivity & accuracy and it shall not exceed 50VA.
- The accuracy class for metering core shall be equal to or better than the accuracy class of the meter specified in the Central Electricity Authority (Installation and Operation of Meters) Regulations.

4. Voltage transformers can be either electromagnetic type or capacitive type Current Transformer

- Current transformers shall comply with the relevant IS/IEC standards.
- The rated currents and ratio, the number of secondary cores, accuracy class, burden, secondary winding resistance, knee point voltage and excitation current shall be in accordance with the requirements of the protection and metering system.
- The rated burden of cores shall be closer to the maximum burden requirement of metering & protection system for better sensitivity and accuracy.
- Instrument Security factor (ISF) shall be less than 5 for CTs upto 400kV voltage class.
- The accuracy class for metering core shall be equal to or better than the accuracy class of the meter specified in the Central Electricity Authority (Installation and Operation of Meters) Regulations.

5. 220KV breaker



- Circuit breakers shall comply with relevant IS/IEC standards.
 - Rupturing/ breaking capacity of 220kV breaker shall be 40 / 50kA (for 1 sec) or shall be at least 25% higher than calculated maximum fault level based on system study during detailed engineering
 - The interrupting medium of circuit breakers shall be SF6.
 - Circuit breaker shall be suitable for single phase and three phase auto-reclosing.
 - Each circuit breaker shall be provided with 2 nos. of trip coils. Two sets of trip circuits shall be connected to separate fuse or miniature circuit breaker (MCB) controlled DC supplies for greater reliability.
 - The circuit breaker shall have the provision for local manual trip which shall be at a position easily accessible to the operating person.
 - Maximum rated break time for circuit breakers shall be 60 ms
6. 220kV Isolators/ disconnectors
- The disconnectors shall comply with relevant IS/ IEC standards.
 - AIS type disconnectors shall have provision for remote and local operation.
 - Disconnectors shall be suitable for Bus Transfer Current Switching duty as per IEC Standard.
7. Insulators
- Porcelain, Glass or composite type insulators complying with the relevant IS/ IEC standards shall be used.
 - The minimum specific creepage distances of insulators shall be 31 mm/kV line to line voltage considering very heavy pollution area.
8. Earthing Switch
- Earthing switch if necessary shall be provided as per CEA/CERC regulation.
 - Earthing switches shall comply with relevant IS/ IEC standards.
 - In AIS, main blades and earth blades shall be interlocked with both electrical and mechanical means, which shall be fail-safe.
 - Earthing switches shall be suitable for manual operation. Only local operation is recommended for earth switches
9. 220kV control & relay panel

- Numerical relays & shall be used for transformer differential, overcurrent, earth fault or any other protection.
- Auxiliary relays shall be used for alarm & trippings from all the field devices i.e. Buchholz, OLTC surge, PRD, Winding & Oil Temperatures, MOG etc.
- Master trip relay shall be provided with trip circuit supervision
- Other specifications as per Contol and Relay panel specifications mentioned at 5.3.23
- Bidder shall study 220kV busbar differential protection scheme of existing plant where point of connection of 75 MW solar plant is proposed. Bidder shall suggest & submit modified scheme for approval of GIPCL. After approval if replacement of existing 220kV Busbar Differential protection relay is necessary; supply of relay with associated hardware i.e. cables, TBs, wires etc. testing, installation and termination shall be in bidder's scope. CT ratio and Characteristic of PS class core of CT in 75MW solar injection bay for busbar differential protection shall match with existing PS class CTs of other bays.**

220/33 kV Step Up Power Transformer

Technical Data Sheet of 220/33 or Step UP Power Transformer

| Sr. | Particulars | 220/33 or Step UP Power Transformer |
|-----|--|-------------------------------------|
| 1 | Rated Capacity | ** |
| 2 | No. of Windings | Two or as per system requirement |
| 3 | Voltage Ratio (HV/LV) | 220KV / 33KV |
| | Vector Group | YNyn0 |
| 5 | Service | Outdoor |
| 6 | Type of cooling | ONAN/ONAF |
| 7 | ONAN Rating | |
| 8 | ONAF Rating | ** |
| 9 | Bi Directional Power Flow | Yes |
| 10 | Temp. rise above 50 Deg C ambiaent Temp. | |



| | | |
|----------------|---|--|
| | Top oil by Thermometer | 45 Deg C |
| | In winding by resistance method | 50 Deg C |
| 11 | | |
| 12 | | |
| 13 | Winding Material | Electrolytic grade copper |
| 14 | Cooler bank Arrangement | 2 X 50% |
| 15 | No. of Phases/ System frequency | 3 Ph / 50 Hz |
| 16 | HV System Voltage Level | 220KV |
| 17 | Highest System HV Voltage | 245KV |
| 18 | LV System Voltage | 33KV |
| 19 | percentage Impedance at the (Normal, working) principle tap position at 75 Deg C highest MVA ONAF and Tolerance | Shall be decided during detailed engineering as per system requirement, As per CEA regulation/guidelines, Tolerance as per IS/IEC standard |
| 20 | Tap Changer Type | On-load tap changer |
| 21 | Tap range and Steps | Shall be decided during detailed engineering as per system requirement, As per CEA regulation/guidelines, as per IS/IEC standard |
| 22 | Location of Tap Changer | On HV Neutral end |
| 23 | Overload Capacity | IEC-60076-7 |
| 24 | Short Circuit withstand time | 2 sec |
| Winding | | |
| 1 | Lightning Impulse withstand voltage HV/LV | 950 / 170 kVp |
| 2 | Lightning Impulse withstand voltage HV Neutral/ LV Neutral | 95 / 170 kVp |
| 3 | Chopped Wave Lightning Impulse withstand Voltage HV/LV | 1045 / 187 kVp |
| 4 | Switching Impulse withstand voltage HV | 750 kVp |
| 5 | One minute power Frequency withstand voltage HV/ LV | 395 / 70 kVrms |

| | | |
|----------------|---|---|
| 6 | One minute power Frequency withstand voltage HV Neutral/ LV Neutral | 38 / 70 kVrms |
| 7 | Insulation HV/ LV | Graded / Uniform |
| 8 | Tan Delta of winding and bushing at amb. Temp. | <0.5% |
| Bushing | | |
| 1 | Rated Voltage HV / LV | Rated Voltage HV / LV |
| 2 | Rated Voltage HV Neutral / LV Neutral | 36 / 36 kV |
| 3 | Lightning Impulse withstand voltage HV/LV | 1050 / 170 kVp |
| 4 | Lightning Impulse withstand voltage HV Neutral/ LV Neutral | 170 / 170 kVp |
| 5 | Switching Impulse withstand voltage HV | 850 kVp |
| 6 | One minute power Frequency withstand voltage HV/ LV | 505 / 77 kVrms |
| 7 | One minute power Frequency withstand voltage HV Neutral/ LV Neutral | 77 / 77 kVrms |
| 8 | Specific creepage distance | 31mm/kV corresponding to the line to line highest system voltage |
| 9 | Maximum Permissible Losses of Transformer | As per CEA guideline “Standard Specification for transformers and reactors” |

** Transformer, 220kV conductor and LV cable/bus duct rating shall be decided based on 100% active power (75 MW) evacuation at 0.95 power factor considering voltage variation of 95% to 105%.

General Specifications for all transformers

- An oil soak pit of adequate capacity shall be provided below each oil filled transformer to accommodate at least 150% of full quantity of oil contained in the transformer/reactor and minimum 300 mm thick layer of gravels or pebbles of approximately 40 mm size.
- Every soak pit below a transformer/reactor shall be suitably designed to contain oil dropping from any part of the transformer/reactor.
- The disposal of transformer oil shall be carried out in an environmental friendly manner through automatic pumping facility.

- d) Noise level of transformer, when energized at normal voltage and frequency with fans and pumps running and measured under standard operating condition shall not exceed the values specified in NEMA standard.
- e) Nominal tapping shall be considered for system study in all the transformers as per CEA regulation/ guideline.

Further, all the transformers specifications shall be as per CEA, CERC, regulations/guidelines.

Transformer Losses : As per IS or as per CEA regulations

Insulating medium Transformer oil as per IS: 12463

33kV Switchgear at SLPP 220kV switchyard end of transmission line (Applicable for Option-II)

- 1. Each 33 kV Transmission line from north plot and south plot shall be terminated in 33kV Indoor switchgear of adequate capacity.
- 2. 33kV switchgear shall consist of Incomer feeders from two transmission lines mentioned above, one outgoing feeder to 33kV/220kV transformer, bus PT panel (protection & metering cores), auxiliary transformer feeder/s, any other feeder necessary for proper functioning of plant.
- 3. Incomer and outgoing panels will consist of VCB / SF6 breakers its control and protection system and associated equipment's i.e. CT for protection & metering, MFM, numerical protective relays, master trip relay, auxiliary relays, indicating lamps, space heater & associated control etc.

Outgoing shall be connected to LV terminal box of 220/33 kV transformer using 33kV cables or busduct.

33kV pooling switchgears at North plot (25MW) & South Plot (50 MW) (Applicable for evacuation option-I & II both)

- 1. Indoor 33kV switchgear shall consist of incomer feeders from ICOG/ RMU of ICR blocks, Outgoing feeders for transmission lines (Option-I) or to 66/33kV transformer LV winding (Option-II), Bus PT panel, Auxiliary Transformers feeder, Spare feeder, capacitor bank feeder (for reactive power compensation) etc.

Specification for 33kV pooling switchgears at North plot, South plot and/or 220kV switchyard

Standards & Codes

| Sl. No. | Standards | Description |
|---------|------------------------|--|
| 1 | IEC 60529/ IS13947 | Degrees of protection provided by enclosures (IP Code) |
| 2 | IEC 60044-1/ IS2705 | Instrument transformers – Part 1 : Current transformers |
| 3 | IEC 60044-2/ IS3156 | Instrument transformers – Part 2 : Inductive voltage transformers |
| 4 | IEC 60044-6 | Instrument transformers – Part 6 : Requirements for protective current transformers for transient performance |
| 5 | IEC 62271-100 | High-voltage switchgear and control gear – Part 100: High-voltage alternating-current circuit-breakers |
| 6 | IEC 62271-200 | High-voltage switchgear and control gear – Part 200: A.C. metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV |
| 7 | IEC 60694 | Common specifications for high-voltage switchgear and control gear standards |
| 8 | IS: 8130 –1984 | Conductors for Insulated Cables |
| 9 | IEC 60255 | Measuring relays and protection equipment |
| 10 | IS 3231 | Electrical relays for power systems protection |
| 11 | IS 9431 | Indoor post insulators of organic material for systems with nominal voltages greater than 1000 V up to and including 300 kV |
| 12 | IEC 60099-4 | Surge arresters - Part 4: Metal-oxide surge arresters without gaps for A.C. systems |
| 13 | IEC 62053 | Electricity metering equipment (A.C.) - Particular requirements |
| 14 | IS 9385 | High voltage fuses |

1. The indoor switchgear system shall include Requisite nos. incoming panels from field units, and outgoing panels to Power/Inverter transformers or the outgoing lines depending

on the system requirement, panels for HV/415 V Auxiliary Transformer, Bus couplers breakers and associated equipment.

2. The HV switchgear panels located indoor shall be complete with cubicles, protection, metering, bus-bar system, cabling, wiring and other accessories, comprising of HV Vacuum/SF6 circuit breaker, AC bus bars (including N-bus bar), Current transformers, Potential transformers, Multifunction meters and other necessary equipment as per system requirements. The quantities shall be finalized during detail engineering based on the proposed configuration.
3. Circuit breaker Interrupter shall be of Vacuum or SF6 type. Rated breaking current shall be higher than calculated maximum fault level based on system study during detailed engineering
4. Current Transformer
 - Current transformers shall comply with the relevant IS/IEC standards.
 - The rated currents and ratio, the number of secondary cores, accuracy class, burden, secondary winding resistance, knee point voltage and excitation current shall be in accordance with the requirements of the protection and metering system.
 - The rated burden of cores shall be closer to the maximum burden requirement of metering & protection system for better sensitivity and accuracy.

10. Instrument Security factor (ISF) shall be less than 5

5. Electromagnetic Voltage Transformer
 - Voltage transformers shall comply with the relevant IS/IEC standards.
 - The number of secondary cores, accuracy class and burden shall be in accordance with the requirements of the protection and metering system.
 - The rated burden of VT cores shall be closer to the maximum burden requirement of metering & protection system for better sensitivity & accuracy and it shall not exceed 50VA.

6. Type Test

HT Switchgear supplied must be of type tested design and certified by any of the accredited certifying agencies in accordance with relevant standards /codes and the type test reports shall be submitted for employer's review

General requirement of 33KV pooling switchgear/s

1. The Indoor HV Switchgear shall be of the steel enclosed type vermin proof, dust, Moisture protected and shall comply with the requirements of latest edition of IEC/IS. The

switchgear boards shall have a single front, single tier, fully compartmentalized, metal enclosed construction complying with IEC 62271-200. Each circuit shall have a separate vertical panel with distinct compartments for circuit breaker truck, cable termination, main bus bars and auxiliary control devices. The adjacent panels shall be completely separated by steel / Aluzinc sheets except in bus bar compartments where insulated barriers shall be provided to segregate adjacent panels.

2. The circuit breakers and bus VTs shall be mounted on with drawable trucks which shall roll out horizontally from service position to isolated position. For complete withdrawal from the panel, the truck shall rollout on the floor or shall roll out on telescopic rails. In case the later arrangement is offered, suitable trolley shall be provided by the Contractor for withdrawal and insertion of the truck from and into the panel. Testing of the breaker shall be possible in isolated position by keeping the control plug connected.
3. Switchgear assembly shall be with the truck in any position SERVICE, ISOLATED or removed, and all doors and covers closed. All doors, removable covers and glass windows shall have gaskets all round with synthetic rubber or neoprene gaskets.
4. The doors and covers shall be constructed from cold rolled steel sheets of 2.0 mm or higher thickness. The gland plate thickness shall be minimum 3.00 mm for hot/cold rolled sheet steel. Gland plates shall be 2.5 mm thick made out of hot rolled or cold rolled steel sheets and for nonmagnetic material it shall be 3.0 mm. Switchboards shall have a degree of protection of IP: 5X for outdoor and IP4X for indoor as per IS/IEC:60947.
5. All the sheet steel work shall be pre-treated in accordance with IS: 6005. The gaskets shall be of good quality EPDM/Neoprene.
6. The indicating lamps be with multiple LEDs shall be installed in the panel.
7. The bus bars shall be of Copper conductors or aluminium conforming to IEC/IS. The bus bar system shall be insulated with PVC sleeves and shall be complaint with UL 224.
8. Circuit breaker shall be according to IEC/IS and shall be complete with the proper interlocking.
9. The current transformer shall be of inductive type. It shall be mounted within the cubicles and shall comply with the requirements of relevant IEC/IS. It shall be used for protection and metering.
10. The potential transformer shall be of inductive type. It shall be mounted within the cubicles on a withdrawable trolley and shall comply with the requirements of relevant IEC/IS. The potential transformer at bus bar shall have requisite number of cores for protection and metering as per the system requirement.



11. Insulating mats of appropriate size confirming to relevant standards are to be provided in front of all the HV switchgear panels for the safety of personnel.
12. Necessary provision/potential free contacts shall be made available for control, status, alarm and indication of faults/status at Main Control Room.
13. In the Service position, the truck shall be so secured that it is not displaced by short circuit forces. Bus bars, jumpers and other components of the switchgear shall also be properly supported to withstand all possible short circuit forces corresponding to the short circuit rating specified.
14. The switchgear construction shall be such that the operating personnel are not endangered by breaker operation and internal explosions, and the front of the panels shall be specially designed to withstand these. Pressure relief device shall be provided in each high voltage compartment of a panel, so that in case of a fault in a compartment, the gases produced are safely vented out, thereby minimizing the possibility of its spreading to other compartments and panels. The pressure relief device shall not however reduce the degree of protection of panels under normal working conditions.
15. To represent the single line diagram, a mimic diagram shall also be made available on the panel. The circuit breaker cubicle shall be provided with space heater and door operated illumination lamp.
16. Suitable lifting hooks shall be provided for each panel.
17. Restricted Earth fault relay for HV side Power transformer shall be provided. The system shall be compatible with station SCADA, regarding input and output needed for operation, control and monitoring of HV switchgear system.
18. All the auxiliary wiring shall be carried out with calculated design voltage grade, single core cable conductor, colour coded, and PVC insulated wires. Conductor size shall be 1.5 mm² (min) for control wiring and 2.5 mm² (min) for CT and space heater circuits.
19. 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.
20. The Contractor shall submit to the Employer the layout arrangement, equipment Drawings, design calculations for short circuit withstand capability, load calculation for bus bar rating selection etc. and other relevant information as per Engineering Information Schedule during detailed Engineering.



5.3.14 Nitrogen Injection Fire Protection System (NIFPS): NIFPS to be provided for all power transformer or Inverter Transformer rating more than or equal to 10 MVA. NIFP system shall be provided with automatic control for fire prevention and fire extinction. The system shall be tested by UL, FM, LPCB or national testing body of BIS accredited laboratory's Test Report required. Fire protection systems shall be required as per CEA/CEIG guidelines for the systems below 10 MW.

5.3.15 General Specifications: Instrument Transformer (33/66/220 kV Switchyard)

- i. The instrument transformers i.e. current and voltage transformers shall be single phase transformer units and shall be supplied with a common marshaling box for a set of three single phase units. The tank as well as top metalics shall be hot dip galvanized or painted Grey color as per RAL 9002.
- ii. The instrument transformers shall be oil filled hermetically sealed units. The instrument transformers shall be provided with filling and drain plugs.
- iii. Polarity marks shall indelibly be marked on each instrument transformer and at the lead terminals at the associated terminal block. The insulators shall have cantilever strength of more than 500 kg.
- iv. Current Transformer, Voltage Transformer, Circuit Breaker and Relays should match –Local distribution authority and GIPCL requirements.
- v. If multicore instrument transformers are permitted by GETCO/DISCOM, secondary terminal box for tariff metering & other cores shall be separate. Moreover secondary terminal box for tariff metering core shall be suitable for sealing by relevant authorities. Its accuracy class, make and specifications shall be as per requirement of GETCO/ DISCOM.

Or / Else

Dedicated Instrument transformers for Tariff metering purpose shall be supplied & installed as per requirement of GETCO / DISCOM.

- vi. Instrument transformers for tariff metering purpose shall be tested at approved laboratory as per requirement of GETCO / DISCOM. Co-ordination and Charges for such testing & logistic shall be in bidder's scope.

5.3.16 Current Transformer (66 kV Switchyard)

- i. Current transformers may be either of the bushing type or wound type. The bushing types are normally accommodated within the transformer bushings and the wound types are

invariably separately mounted. The location of the current transformer with respect to associated circuit breaker has an important bearing upon the protection scheme as well as layout of, substation. Current transformer class and ratio shall be determined by electrical protection, metering consideration.

- ii. Technical specifications – Current ratings, design, Temperature rise and testing etc. should be in accordance with IS: 2705 (part I to IV).

Type and Rating

- The current transformer should be of outdoor/ indoor type, single phase, oil immersed, self-cooled and suitable for operation in 3 phase solidly grounded system.
- Each current transformer should have the following particulars under the site conditions for the system under design (typical values for 66 kV systems are given).
- General Parameters: 66 kV CT.
- Each current transformer should have the following particulars under the site conditions for the system under design (typical values for 66 kV system are given).

Table 5-11 General parameters for 66 kV CT

| Sr. | Particulars | Details |
|-----|---|---|
| 1 | Highest system Voltage (Um) | 72 kV rms |
| 2 | Rated frequency | 50 Hz |
| 3 | System Neutral Earthing | Effective earthed |
| 4 | Installation | Outdoor/indoor(IP 65) |
| 5 | Rated short time thermal current | 25 kA for 3 sec or appropriate thermal current as per design calculations |
| 6 | Rated dynamic current | 63 kA (Peak) appropriate dynamic current as per design calculations |
| 7 | Rated min power frequency withstand voltage (rms value) | 140 kV |
| 8 | Rated lightning impulse withstand voltage (peak value) | 340 kV |
| 10 | Minimum Creepage distance | 31mm/kV |
| 11 | Temperature rise | As per -IS 2705/1992 |
| 12 | Type of insulation | Class A |

| | | |
|-----------|--|---|
| 13 | Number of cores | For Transformer : Three (3) with One (1) protection core and One (1) metering core (1) Diff. Protection of Transformer For ABT Meter Line Side : Three (3) with One (1) protection core and One (2) ABT metering core Main & Check |
| 14 | CT secondary current | Protection cores – 1 Amp. Metering Core – 1 Amp (With Highest Accuracy Class) |
| 15 | Number of terminals in marshalling box | All terminals of control circuits wired up to marshalling box plus 20 terminals spare |
| 16 | CT ratio & Rated VA Burden, short time thermal rating ,class of accuracy | Minimum burden required (As per GETCO requirement) : 1. Metering core – 5VA min. 2. Protection core – 10VA min. |

5.3.17 General Parameters of 66kV VT

The Bidder has to furnish the specifications of 663 kV VT with the Bid.

Table 5-12 General parameters for 66 kV VT

| Sr. | Particulars | Details |
|------------|--|--|
| 1 | Highest system voltage (Um) | 72 kV |
| 2 | System neutral earthing | effective earthed |
| 3 | Installation | Outdoor (IP 65) |
| 4 | System fault level | Appropriate/ As per design |
| 5 | Rated min power frequency withstand voltage (rms value) | 140 kV |
| 6 | Rated lightning impulse withstand voltage (peak value) | 340 kV |
| 7 | Standard reference range of frequencies for which the accuracy are valid | 96% to 102% for protection and 99% to 101% for measurement |
| 8 | Rated voltage factor | 1.2 continuous & 1.9 for 30 sec |
| 9 | Class of Accuracy | 0.5 / 3P, IS3156/1992 |
| 10 | Minimum Creepage distance | 31 mm/kV |

| | | |
|-----------|--|---|
| 11 | Stray capacitance and stray conductance of LV terminal over entire carrier frequency range | As per IEC:358 |
| 12 | One Minute Power frequency Withstand voltage for secondary winding | 3 kV rms |
| 13 | Temp. rise over an ambient temp. of 50 deg. C | As per IS 3156/1992 |
| 14 | Number of terminals in control spare. | All terminals of control circuits wired Cabinet up to marshalling box plus 10 terminals |
| 15 | Rated total thermal burden | 300 VA min. |
| 16 | Number of cores | 2 (two) – 1 for protection and one for metering with 0.5 class accuracy. |
| 17 | Rated Output, insulation level, transformation ratio, rated voltage factor | Should be provided by the Contractor. |

5.3.18 Circuit Breaker (66/ kV)

- i. The circuit breakers shall be capable of rapid and smooth interruption of currents under all conditions completely suppressing all undesirable phenomena even under the most severe and persistent short circuit conditions or when interrupting small currents or leading or lagging reactive currents. The circuit breakers shall be 'Restrike-Free' under all operating conditions. The details of any device incorporated to limit or control the rate of rise of restriking voltage across, the circuit breaker contacts shall be stated. The over voltage across, the circuit breaker contacts shall be stated. The over voltage caused by circuit breaker while switching inductive or capacitive loads shall not exceed 2.5 times the highest phase to neutral voltage. The actual make and break times for the circuit breakers throughout the ranges of their operating duties shall be stated in the offer and guaranteed.
- ii. The arc quenching chambers shall have devices to ensure almost uniform distribution of voltage across the interrupters.
- iii. Appropriate & adequate Capacity AC& DC power supply shall be provided as per the IEC 60898 / IEC 62271 – 100 or equivalent Indian Standards for control circuit and protection

relay circuit, fuses, annunciations and remote operating and controlling facility from the Main Control Room.

- iv. Circuit breaker shall be C2/MI class under all duty conditions and shall be capable of performing their duties without opening resistor. The circuit breaker shall meet the duty requirement of any type of fault or fault location and shall be suitable for line charging and dropping when used on 66 kV effectively grounded or ungrounded systems and perform make and break operations as per the stipulated duty cycles satisfactorily.
- v. The circuit breaker shall be capable for breaking the steady & transient magnetizing current corresponding to 66 kV transformers. It shall also be capable of breaking line charging currents as per IEC- 62271-100 with a voltage factor of 1.4.
- vi. The rated transient recovery voltage for terminal fault and short line faults shall be as per IEC: 62271-100.
- vii. The Bidder shall indicate in the Bid, the noise level of breaker at distance of 50 to 150 m from base of the breaker.
- viii. The Bidder may note that total break time of the breaker shall not be exceeded under any duty conditions specified such as with the combined variation of the trip coil voltage, pneumatic pressure etc. While furnishing the proof of the total break time of complete circuit breaker, the Bidder may specifically bring out the effect of non-simultaneity between same pole and poles and show how it is covered in the guaranteed total break time.
- ix. While furnishing particulars regarding the D.C. component of the circuit breaker, the Bidder shall note that IEC-62271-100 requires that this value should correspond to the guaranteed minimum opening time under any condition of operation.
- x. The critical current which gives the longest arc duration at lock out pressure of extinguishing medium and the duration shall be indicated.
- xi. All the duty requirements specified above shall be provided with the support of adequate test reports.
- xii. Circuit breaker shall be SF6 with electrically spring charged mechanism. The operating mechanism shall be anti-pumping and trip free (as per IEC definition) electrically under



every method of closing. The mechanism of the breaker shall be such that the position of the breaker is maintained even after the leakage of operating media and / or gas. The circuit breaker shall be able to perform the duty cycle without any interruption.

- xiii. Electrical tripping shall be performed by shunt trip coil. Provision shall also be made for local electrical control. 'Local / remote' selector switch and close & trip push buttons shall be provided in the breaker central control cabinet. Remote located push buttons and indicating lamps shall also be provided. The SF6 coil DC supply through appropriately rated battery bank and charger (FC + FCBC) to be supplied by the Contractor.
- xiv. Operating mechanism and all accessories shall be in local control cabinet. A central control cabinet for the three poles of the breaker shall be provided along with supply of necessary tubing, cables, etc.
- xv. Mounting and supporting structure for Circuit Breaker. The circuit breakers should be self-supporting type. However, if necessary for the purpose of minimum ground clearance the circuit breakers should be mounted on raised steel structures which should be included in the scope of supply of circuit breaker.
- xvi. Following information and data for design of foundations from the supplier of the circuit breaker be obtained.
 - a. Dead weight per pole for complete circuit breaker
 - b. Static bending moments above the feet of each pole and for complete circuit breaker.
 - c. Static shear force at the foot of each pole and for complete circuit breaker
 - d. Maximum height of the steel supporting structure
 - e. Maximum diameter of the pole
 - f. Maximum horizontal force acting at upper terminal of each pole due to impact of closing/opening of the circuit breaker
 - g. Max. Impact loading in terms of equivalent static load both compression and upward due to opening/closing of the breakers. It shall be clearly stated whether these forces shall act simultaneously or at different timing.
 - h. No. of steel supporting columns provided for mounting the equipment.
 - i. The above data should represent static reactions for the worst windage or operation conditions. Circuit breakers whether of self-supporting type or

on raised steel structure should ensure minimum sectional clearance (say 3500 mm for 66 kV)

- j. Necessary connecting materials such as clamps, bolts, nuts, washers etc. and fixing bolts for mounting the equipment on the supporting structures wherever required should be obtained from the circuit breaker supplier.

- xvii. **Applicable Standards:** The materials shall conform in all respects to the relevant Indian Standard Specifications/ IEC Standards, with latest amendments indicated below in Table 5-13.

Table 5-13 Applicable Standards for Circuit Breakers

| Indian Standard | Title | International & Internationally recognized standard |
|-----------------|---|---|
| ISS-13118/1991 | General requirements for Circuit breakers for voltage above 1000 V | IEC 62271-100-1/2001 |
| ISS-2633/1964 | Methods of testing uniformity of coating of zinc coated articles | |
| ISS-2147/1962 | Degree of protection provided by enclosures for low voltage switchgear & control gear | |

- xviii. **General Parameters of Circuit Breaker:**General parameters: Outdoor/ Indoor SF6type Circuit Breaker.

Table 5-14 General Parameters for 66 kV Circuit Breakers

| Sr. | Particulars | Details |
|-----|---|--------------------|
| 1 | Type of circuit breaker | SF6 Type |
| 2 | Highest System Voltage | 72 kV |
| 3 | Rated operating voltage | 66 kV |
| 4 | Rated frequency | 50 Hz (+3% to -5%) |
| 5 | Number of poles | Three (3) |
| 6 | Rated/minimum power frequency Withstand voltage | 140 kV |
| 7 | Rated lightning impulse Withstand voltage | 340 kV |
| 8 | Minimum Creepage distance | 31 mm/kV |

| | | |
|----|------------------------------|--|
| 9 | Rated operating duty cycle | 0 - 0.3 sec. - CO – 3 min. – CO |
| 10 | Rated line charging breaking | As per IEC |
| 11 | Reclosing | Single and three phase high speed auto reclosing |
| 12 | Maximum fault level | 31.5 kA (rms) for 1 sec Or as per system requirement |
| 13 | Auxiliary contacts | As required plus 6NO and 6NC contacts per pole as spare. |
| 14 | Noise level | Maximum 140dB at 50m distance from base of circuit breaker |
| 15 | Seismic acceleration | 0.4g horizontal |
| 16 | Colour Shed | RAL 7035 |

xix. General Parameters of **SF6 Insulated Ring Main Unit (RMU)**:

Table 5-15 General Parameters for SF6 Type RMU/ICOG

| Sr. | Particulars | Details |
|-----|---|---|
| 1 | Type of Ring Main Unit | Metal enclosed, compact module, panel type, IEC 62271-200. Transformer Breaker must be VCB. |
| 2 | Highest System Voltage | 33 kV |
| 3 | Rated operating voltage | 12/36 kV |
| 4 | Rated frequency | 50 Hz (+3% to -5%) |
| 5 | Number of poles | Three (3) |
| 6 | Rated/minimum power frequency Withstand voltage | 28/70kV |
| 7 | Rated lightning impulse Withstand voltage | 170 kV |

| | | |
|-----------|------------------------------|--|
| 8 | Rated Current Busbar | 630A |
| 9. | Insulation Gas | SF ₆ |
| 10 | Minimum Creepage distance | 31mm/kV |
| 11 | Rated operating duty cycle | 0 - 0.3 sec. - CO – 3 min. – CO |
| 12 | Rated line charging breaking | As per IEC |
| 13 | Reclosing | Single and three phase high speed auto reclosing |
| 14 | Maximum fault level | as per system requirement |
| 15 | Rated Making Capacity | 52 kA |
| 16 | Rated Breaking Capacity | according to 66KV fault level. Necessary calculations shall be submitted by the bidder |
| 17 | Auxiliary contacts | As required plus 6NO and 6NC contacts per pole as spare. |
| 18 | Noise level | Maximum 140dB at 50m distance from base of circuit breaker |
| 19 | Colour Shed | RAL 7035 |

xx. Circuit Breaker protection against

- Over Current
- Earth fault
- Under voltage & over voltage protection
- Under frequency & over frequency
- SF₆ gas pressure low (where applicable)
- DC supply failure

5.3.19 Protective Relays

- The Solar PV system and the associated power evacuation system interconnections should be protected as per IEC 61727 Ed.2, norms. Over current relays, , differential protection relays (for transformer rating more than 5 MVA) and earth fault relays have to be essentially

provided. All relay should be numerical type & should be remote operating and controlling facility from the control room.

- ii. The numerical relays shall have RS 485 port for communication.
- iii. The operating voltage of the relays shall be 110 V DC/220 V DC as per battery bank rating.
- iv. Detailed Design calculations shall be provided on fault power computations and the philosophy of protective relaying with respect to short circuit kA calculations. Design, drawing and model of protection relay shall be approved by the Owner/Electricity Authority (GETCO).

5.3.20 Earthing for PV Array

- i. The photovoltaic modules, BOS and other components of power plant requires adequate earthing for protecting against any serious faults as guided by IEC 60364.
- ii. The earthing system shall be designed with consideration of the earth resistivity of the project area. The earth resistivity values shall be measured prior to designing the earthing system. Unless otherwise specified, earthing system shall be in accordance with IS: 3043 and IEEE 80, Indian Electricity Rules, Codes of practice and regulations existing in the location where the system is being installed.
- iii. The permissible system fault power level at all the voltage shall be kept in consideration while designing the earthing system. Each array structure of the PV yard, LT power system, earthing grid for switchyard, all electrical equipment, control room, PCU, All junction boxes, ACDB & DCDB, all motors and pumps etc. shall be grounded properly as per IS 3043 - 1987. All metal casing / shielding of the plant shall be thoroughly grounded in accordance with Indian electricity act / IE Rules.
- iv. The earthing for array and LT power system shall be made of 3 meter long 16 mm² Copper rod with chemical compound filled, double walled earthing electrodes including accessories, and providing masonry/ enclosure with cast iron cover plate/, chemical compound mix as required as per provisions of IS: 3043.
- v. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.



- vi. Each string/ array and MMS of the plant shall be grounded properly. The array structures are to be connected to earth pits as per IS standards. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.
- vii. The complete earthing system shall be mechanically & electrically connected to provide independent return to earth.
- viii. For each earth pit, a necessary test point shall be provided.
- ix. In compliance to Rule 11 and 61 of Indian Electricity Rules, 1956 (as amended up to date), all non-current carrying metal parts shall be earthed with two separate and distinct earth continuity conductors to an efficient earth electrode.
- x. The Contractor should submit the earthing system design calculations along with the system layout for the Owner's approval prior to the installation of the system
- xi. Unless otherwise specified, the earthing system primary and secondary grid conductors, equipment connections shall be constructed with galvanized iron flat. However the earthing of transformer neutrals, plc and inverter terminals and electronic earthing shall be provided using copper earthing conductor only.
- xii. Earthing Mesh is to prepared and installed in entire power plant.
- xiii. 32 mm dia. Rod shall be considered for earthing of the arrayyard and substation block

5.3.21 Lightning Protection for PV Plant & Earthing

- i. The source of over voltage can be lightning or other atmospheric disturbance. Main aim of over voltage protection is to reduce the over voltage to a tolerable level before it reaches the PV or other sub-system components as per IEC 60099 / IS: 2309 – 1989 (Reaffirmed – 2005), Edition 3.1 (2006-01). Lightning Protection System required for Solar PV Plant, Inverter Room, and Substation Structure & Control Room within the EPC scope of work. The intent of specification can be conventional as per IS : 2309 or can be Early Streamer Emission Type depending upon Area, Protected Equipment & Technical feasibility. Necessary concrete foundation for holding the lightning conductor in position to be made after giving due consideration to shadow on PV array, maximum wind speed and maintenance requirement at site in future. We recommended going with Early Stream Emission Air Terminal

Technology as per NFC 17-102 / IEC 62305-2. Level of Protection must be defining as per Rolling Sphere Method LPL-I, LPL-II, LPL-III & LPL-IV where the radius shall be of 20mtr, 30mtr, 45mtr & 60mtr respectively.

- ii. $R_p(h)$: Protection radius at a given height (h) $R_p(h) = \sqrt{2rh - h^2 + \Delta(2r + \Delta)}$ (for $h \geq 5$ m)
For $h < 5$ m, refer to the table below h : Height of the OPR tip above the surface(s) to be protected r(m) : Standardized striking distance $\Delta(m) = 106 \cdot \Delta T$ (OPR efficiency)

OPR radius of protection

| Protection level | I (r = 20 m) | | | II (r = 30 m) | | | III (r = 45 m) | | | IV (r = 60 m) | | |
|------------------|--------------------------------|--------|--------|---------------|--------|--------|----------------|--------|--------|---------------|--------|--------|
| OPR | OPR 30 | OPR 45 | OPR 60 | OPR 30 | OPR 45 | OPR 60 | OPR 30 | OPR 45 | OPR 60 | OPR 30 | OPR 45 | OPR 60 |
| h (m) | Radius of protection R_p (m) | | | | | | | | | | | |
| 2 | 19 | 25 | 31 | 22 | 28 | 35 | 25 | 32 | 39 | 28 | 36 | 43 |
| 3 | 29 | 38 | 47 | 33 | 42 | 52 | 38 | 48 | 58 | 43 | 57 | 64 |
| 4 | 38 | 51 | 63 | 44 | 57 | 69 | 51 | 65 | 78 | 57 | 72 | 85 |
| 5 | 48 | 63 | 79 | 55 | 71 | 86 | 63 | 81 | 97 | 71 | 89 | 107 |
| 6 | 48 | 63 | 79 | 55 | 71 | 87 | 64 | 81 | 97 | 72 | 90 | 107 |
| 8 | 49 | 64 | 79 | 56 | 72 | 87 | 65 | 82 | 98 | 73 | 91 | 108 |
| 10 | 49 | 64 | 79 | 57 | 72 | 88 | 66 | 83 | 99 | 75 | 92 | 109 |
| 15 | 50 | 65 | 80 | 58 | 73 | 89 | 69 | 85 | 101 | 78 | 95 | 111 |
| 20 | 50 | 65 | 80 | 59 | 74 | 89 | 71 | 86 | 102 | 81 | 97 | 113 |
| 45 | 43 | 65 | 76 | 58 | 75 | 89 | 75 | 90 | 105 | 89 | 104 | 119 |
| 50 | 40 | 65 | 74 | 57 | 75 | 88 | 75 | 90 | 105 | 89 | 104 | 120 |
| 55 | 36 | 65 | 72 | 55 | 75 | 86 | 74 | 90 | 105 | 90 | 105 | 120 |
| 60 | 30 | 65 | 69 | 52 | 75 | 85 | 73 | 90 | 104 | 90 | 105 | 120 |

- ii. The lightning conductor shall be earthed through flats and connected to the earth mats as per applicable Indian Standards with earth pits. Each lightning conductor shall be fitted with individual LA counter and earth pit as per required Standards including accessories, and providing masonry enclosure with cast iron cover plate having locking arrangement, chemical compound as per provisions of IS.
- iii. If necessary more numbers of lightning conductors may be provided as per design calculation
- iv. The Contractor shall submit the drawings and detailed specifications of the PV array lightning protection equipment.
- v. The design, manufacture, inspection, testing and performance of Lightning Arrester shall comply with all currently applicable statutes, safety codes, provision of latest Indian Electricity Act, Indian Electricity Rules and Regulations of Statutory Authorities.
- vi. Contractor shall provide dedicated two earth pits for Lightning Arrestor as per relevant IS standard.

5.3.22 Isolators cum Earthing Switches, Contacts, Insulators, Busbars

- i. This specification covers design, manufacture, testing and supply of the isolators equipped with motorised and provision for manual operation for 66 KV, 800 Amps with manually



operated earth switch .The Isolators and Isolator-cum-Earthing Switched shall comply with the requirements of the IS: 9921 and IEC: 129 (latest edition) except specified herein. The Insulators shall comply with the requirements of IS : 2544 and IEC : 168-1988 (latest edition) for 66 kV pole mounted structure wherever required. 66 kV pole mounted structure would be supplied, installed and commissioned by the Contractor wherever required.

- ii. The isolator shall be of the equipped with motorised operation and with povision for manual operation with earthing switches (manual operation) and shall complete with all parts and accessories including insulator operating rods, mounting attachments, necessary for their efficient operation. The equipment shall confirm in all respect to high standards of engineering Equipment shall capable of performing in continuous commercial operation up to the suppliers guarantee in a manner acceptable to the client, The equipment offered shall be complete with all components necessary for its effective and trouble free operation along with associated equipments, interlock, protection schemes, etc. Such components shall be deemed to be within the scope of the Contractor's supply irrespective of whether those are specifically brought out in this specification or not. All similar parts particularly removable ones shall be interchangeable.
- iii. Each pole shall have three Pedestal type of Insulator's stacks. Necessary arrangements shall be provided for proper alignment of the contacts. Ganged operated links shall be so designed that all phases shall make and break simultaneously.The design of Isolators and Isolator-cum-Earthing Switches shall be provided for positive control of blades in all positions with minimum mechanical stress on the Insulators. Fixed guides shall be so provided that proper setting of contacts shall be obtained, when a blade is out of alignment even by 25mm in either direction. All movable parts which may be in current path shall be flexible copper conductor of adequate cross-section and capacity, which shall be furnished under bill of material.

Service Condition:

The 66 kV triple pole air break isolators are intended to be used primarily for sectionalizing 66 kV UG cable portion of the line with 66 kV overhead portion of the line.

Isolator shall confirm IS: 9921(Part 1 to 4) & IEC 600 - 129 "alternating current disconnects (Isolators) and earthing switches", and IS 9921 (Part-I to IV) "Specification for alternating current disconnects (isolators) and earthing switches for voltages above 1000V"



- a. The moving & fixed contacts shall be made of hard drawn electrolytic grade copper strips and shall be heavy duty self-aligning & high pressure type preferably which applies pressure to the contact surfaces after the blades are fully closed and release the pressure before they start to open. High pressure type contacts shall wipe the contact surfaces, while opening and closing. The contacts shall be so designed that wiping action shall not cause securing or abrasion on the contact surfaces. The wiping action shall be sufficient to remove oxide film, formed during the operation of the switches. The pressure shall be developed by rotation of the entire blade.
- b. The temperature rise of contacts due to the flow of rated short circuit current for a period of 3 seconds shall not cause any annealing or welding of contacts.
- c. The arcing contacts, if provided shall close first and open last so that no damage is caused due to arcing whatever to the main contacts. The Contractor shall give full details of such contacts with necessary drawings.
- d. The female contact and its tensioning by spring shall be such that there will, always, be a positive contact with adequate pressure to give enough contact surface for the passing of current. The springs provided should not go out of alignment or get entangled with the male contact during operation. The details of springs shall be furnished on the G.A. drawing.

INSULATORS: The isolator shall be provided with porcelain solid core insulators.

- i. These shall be of stacking type to be used. The dimensions and other parameters unless otherwise specified shall generally conform to IS - 5350-Part-11 & IEC 273.
- ii. The cylindrical type post insulators shall be of solid core type. Insulators of similar type shall be interchangeable. The mechanical strength class for outdoor cylindrical post insulators shall be of strength class 6, corresponding mechanical strength in tension, compression and torsional shall be as per IS : 53550 Part - II. When operated at maximum system voltage, there shall be no electrical discharge. Shielding rings, if necessary shall be provided.
- iii. The parameters of the insulators required shall conform to IS : 0350 - Part - II - 1973 or IEC 273.
- iv. The cylindrical post insulators shall consist of single unit only.
- v. The insulator shall be provided with a completely galvanized steel base designed for mounting on the support. The base and mounting arrangement shall be such that the insulator

shall be rigid and self-supporting and no guying or cross bracing between phase shall be necessary.

vi. **Porcelain of the insulator:**

- a. The porcelain used for the manufacture of the insulators shall be homogenous, free from laminations and other flaws or imperfections that might effect the mechanical or dielectric quality and shall be thorough vitrified, tough and impervious to moisture. The glazing of the porcelain shall be uniform brown colour, with a smooth surface arranged to shade away rain water and free from blisters, burns and other similar defects. Insulators shall be interchangeable.
- b. The porcelain and metal parts shall be assembled in such a manner and with such materials that any differential thermal expansion between the metal and porcelain parts throughout the operating temperature range will not loosen the parts or electrical strength or rigidity. The assembly shall not have excessive concentration of electrical stress in any section or across leakage surfaces. The cement used shall not give rise to chemical reaction with metal fittings. The insulator shall be suitable for water washing by rains or artificial means in service conditions. Further the insulators to be supplied shall be of high- quality and should not result in mismatch and misalignment of stacks during erection and operation.
- c. Each cap shall be of a high grade cast iron or malleable steel casting or steel forging. Cap and base insulators shall be interchangeable with each other. The insulator shall conform to the requirement of the latest edition of IS: 2544, or any other equivalent standard. The Bidder should furnish the characteristics of insulators in the Bid.

Busbars

- i. The outdoor bus-bars and equipment connections shall be with ACSR /AAA conductor (Suitable size as per design).
- ii. The bus-bars and the connection jumpers shall be supported on post insulators wherever required.
- iii. The ACSR bus bars are system of wires strung between two supporting structures and supported by strain type insulators. The stringing tension may be limited to 500-900 kg. depending upon the size of the conductor used. These types of bus bars are suitable for earthquake prone areas.



- iv. Bus bar Material – The materials in common use for bus bars and connections of the strain type are ACSR conductor.
- v. Since aluminum oxides rapidly great care is necessary in making connections. In the case of long spans expansion joints should be provided to avoid strain on the supporting insulators due to thermal expansion or contraction of pipe.
- vi. The bus bar sizes should meet the electrical and mechanical requirements of the specific application for which they are chosen.
- vii. The isolator shall be provided with padlocking device to permit locking of the isolator in both fully open and fully closed positions.

5.3.23 Control & Relay Panel Specifications (220/66 kV)

- i. The control & relay panel shall be free standing, simplex type, floor mounting type, fabricated from 2 mm thick MS sheet for main enclosure and 1.6 mm thick MS sheet for internals and partitions. The main enclosure shall be mounted on a base frame fabricated out of 100x50 ISMC mild steel section.
- ii. Selective, sensitive, fast, graded and reliable protection system shall be provided for transmission lines, transformers, reactors, bus bars, EHV/HV cables, etc. so as to automatically isolate the faulty element.
- iii. The enclosure external finish color shade shall be decided by the Owner, The internal surface shall have a glossy white finish all over.
- iv. The control & relay panel shall contain the following metering and protection devices:
 - Numerical relay with communication protocol shall be as per IEC-61850/ relevant IS., auxiliary and master trip relays
 - Event logger and disturbance recorder shall be provided as part of sub- station or switchyard automation system for substation or switchyard upto 400 kV voltage class
 - Metering, Indications & Controls
 - Ammeter – 0 – A

- Ammeter selector switch
- Voltmeter – 0 – 12/36 kV
- Voltmeter selector switch
- MFM (Multifunction Meter) to display the following parameters : MW, MVA, MVArh, MVAr Cos Ø, Hz,
- Indication lamps for R, Y, B phases, Breaker ‘ON’ (R), Breaker ‘OFF’ (G), Breaker ‘TRIP’ (A), Spring charged (W), Trip Circuit Healthy (B)
- TNC switch, spring return to neutral position shall be provided for circuit breaker operation.
- Local / Remote selection switch for circuit breaker operation
- Semaphore indicators (LED type) for CB and Isolator ‘Open’ & ‘Close’ positions
- Mimic diagram for the 220/66/33 kV systems with aluminum strips and ‘ON’ ‘OFF’ indications for isolators

5.3.24 Low Voltage Switchgear

- i. This specification is for the 415V TP&N Power Control Centre (PCC).
- ii. The PCC shall be rated for the maximum output of the supply transformer feeding the system.
- iii. The short circuit withstand rating (1 sec) at rated voltage of the switchgear shall be minimum of 20 kA (rms) and corresponding dynamic rating shall be 50 kA (peak).
- iv. The configuration of the PCCs shall be as per the Single Line Diagram of the system.

5.3.25 Execution

- i. Single front / compartmentalized, modular design, degree of protection IP52 with provision of extension on both sides.
- ii. Incomer feeders: mains incomers -
- iii. MCCBs with shunt trip facility. PCC shall be with two incomers from two auxiliary transformers with automatic changeover facility through buscoupler in case of failure of one of the auxiliary transformer. Contactors of suitable rating shall be used for auto changeover facility.
- iv. Outgoing feeders : / Moulded Case Circuit Breakers (MCCBs)
- v. The color finish shade of switchgear enclosure for interior shall be glossy white & for exterior it shall be light grey, semi glossy shade 631 of IS: 5. If a different exterior shade is desired by the PURCHASER, the same shall be intimated to the supplier.

- vi. The PCC shall be fabricated out of CRGO sheet steel; 2 mm thick for the outer shall all-round. The internal walls and separators shall be of 1.6 mm thick CRGO sheet steel.
- vii. The gland plates shall be 3 mm thick.

5.3.26 Control & Relay Panel Specifications for 415 V TP&N Power Control Centre (PCC)

- i. This specification is for the 415V TP&N Power Control Centre (PCC).
- ii. The PCC shall be rated for the maximum output of the supply transformer feeding the system. The short circuit withstand rating (1 sec) at rated voltage of the switchgear shall be minimum of 20 kA (rms) and corresponding dynamic rating shall be 50 kA (peak)
- iii. The configuration of the PCCs shall be as per the Single Line Diagram of the system.

Execution

Power Control Centres (Construction)

- a. Single front / compartmentalized, modular design, degree of protection IP52 with provision of extension on both sides.
- b. Incomer feeders: mains incomer - Electrically operated draw out type Air Circuit Breakers (ACBs).
- c. Outgoing feeders : Electrically operated draw out type Air Circuit Breakers (ACBs) / Moulded Case Circuit Breakers (MCCBs)
- d. The colour finish shade of switchgear enclosure for interior shall be glossy white & for exterior it shall be light grey, RAL 7035 of IS: 5. If a different exterior shade is desired by the PURCHASER, the same shall be intimated to the supplier.
- e. The PCC shall be fabricated out of CRGO sheet steel; 2 mm thick for the outer shall all-round. The internal walls and separators shall be of 1.6 mm thick CRGO sheet steel
- f. The gland plates shall be 3 mm thick

Control Circuit

- a. Control supply for breaker closing / tripping - 110/220 V DC
- b. Air Circuit Breaker spring charge motor – 240 V AC, 1 phase
- c. Moulded Case Circuit Breakers – 240 V AC, 1 phase
- d. Indications, annunciation – 110/220 V DC
- e. Space heater, sockets, etc. – 240 V AC, 1 phase

Busbar and Cable Cavity

- a. The material for main bus bars and tap off bus bars shall be electrolytic grade aluminum with HR PVC sleeved insulation
- b. Bus bars shall be suitable for short circuit rating and current suitable for all connected load.
- c. Bottom cable entry for incoming and outgoing cables
- d. A suitable gland plate shall be supplied for termination of power, control and instrumentation cables.
- e. Whenever feeders are housed in multi-tier configuration, these tiers shall be segregated by sheet metal barriers

5.3.27 Control Room Electrical Wiring

- i. Electrification of building shall be carried out as per IS 732-1989, IS 46481968 and other relevant standards. Suitable AC Distribution Board should be designed to Supply AC power in Control room.
- ii. Control room AC distribution Board theoretical design, calculations and detailed explanations along with drawing shall be provided and approved by GIPCL.

5.3.28 Auxiliary Power Supply

- i. The Contractor shall install two separate minimum 100 kVA, 33/ 11 kV / 0.415 KV step down transformers (considering 100% redundancy for auxiliary power) for 75 MW (AC) Solar PV Plant to supply power for internal equipment such as power for control equipments, battery chargers, UPS , area lighting, water pumps, oil filtration and conference room fixtures, control room lighting and air-condition, etc. Separate transformers with necessary protections shall be installed for pooling switchgear of North plot, South plot and 220KV switchyard bay at SLPP.
- ii. This auxiliary power should be utilized directly from the grid through a separate meter and should not interfere with accounting of solar electricity fed into the grid.
- iii. Each ICR/ block shall consist of one 415V, 3 pahse 4 wire Power Distribution Board (PDB). Each PDB shall be with main & standby transformers of sufficient rating. Input to PDB transformers shall be from secondary terminal box of Inverter Duty Transformer or AC Incomer of PCU. PDB shall be comprise transformers Incoming

& outgoing MCBs, 415V outgoing MCBs, cooling fans (if required) and ventilation facility. PB shall preferably be installed at Inverter Station.

5.3.29 DC Battery & Charger

- i. Adequate capacity DC battery Bank should be provided for emergency control supply of inverters, control / protection system & emergency lighting. A appropriate capacity battery charger (FC + FCBC) with relevant IS/IEC standards & protection and automatic change over system should be provided to charge the battery bank along with relay circuit, fuses, annunciations and remote operating and controlling facility from the Main Control Room.
- ii. A DC power supply Distribution panel/board should be supplied along with the Charger as per relevant IS standards. Control room DC Battery Bank & DC supply system theoretical design, calculations and detailed explanations along with drawing shall be provided and approved by GIPCL / GETCO.
- iii. All DC Batteries the batteries shall have the following specifications
 - Two sets of 220V/110V (Bank of 2.0 V cells), Lead acid SAN container torr tubular batteries (OPzS O = Ortsfest (stationary) Pz = PanZerplatte (tubular plate) S = Flüssig (flooded)) complete with electrolyte, racks, consumables and all accessories **for North plot MCR, South plot MCR and 220KV switchyard at SLPP (Total 6 sets).**
 - Two numbers 220 V/110 V DC FC+FCBC chargers.
 - Two numbers 220V/110 V, 2 pole, DC MCCB in sheet steel enclosure for battery set
 - UPS batteries for North plot MCR, south plot MCR and 220kV switchyard may be combined with one of the batteries in each set of two batteries mentioned above. Battery sizing calculation shall be submitted by the bidder for approval.
- iv. Each 220 V/110V DC system shall be sized to feed following equipment in the Substation.
 - Control power requirements of Substation equipment and C&R panels
 - Control power requirements 33 kV switchgear.
 - Control power requirements of LV system
 - Power requirement of UPS / UPS's



- v. The battery shall be provided with epoxy paint coated exhaust fan for removal of gasses released from the battery cells.
- vi. The data sheet for the battery shall be submitted along with the Bid for evaluation.

5.3.30 Earthing

- i. Earthing bus bar shall be terminated at both ends of the switchgear to suit the connections to outside earthing conductor. All components inside the module are required to be earthed individually and are to be looped and connected to the horizontal earth bus.

Terminals

- a. CT circuit - Isolating link type terminals with shorting facility
- b. PT circuit – clip on type terminals
- c. Spare contacts shall be wired up to terminal block. 10% spare terminals shall be provided for each module

Specific Requirements

- 1. All ACBs shall be 4 pole, electrically operated, draw-out type, with closing coil, spring charge motor, trip coil, TNC switch for close and trip, manual closing and tripping push buttons, door I/L, test and service position micro switches, emergency P.B., safety shutters, etc. The circuit breaker shall be provided with anti-pumping feature.
- 2. ACBs shall be complete with microprocessor release and shall be provided with over current, short circuit and earth fault protections.
- 3. Minimum 10% spare feeders of each rating shall be provided in the switchgear. One (1) spare feeder is required for 33kV VCB panel.
- 4. All current transformers shall have 5/1A secondary and all meters shall be suitable for 5/1 A operation.
- 5. All indicating lamps shall be of LED cluster type. ACB feeders shall be provided with ON, OFF, AUTOTRIP, SPRING CHARGED, TEST, SERVICE, TRIP CIRCUIT HEALTHY indications
- 6. All indicating instruments shall be flush mounting, Digital, 96 sq.mm size.
- 7. Window annunciator with hooter and accept, test, reset button shall be provided. Necessary auxiliary relays for contact multiplication shall be provided in the panel.

8. The maximum temperature of the bus bars, droppers and contacts at continuous current rating under site reference ambient temperature of 50° C shall not exceed 105° C.

Instrumentation: Switchgear instrumentation shall be provided as follows:

- a. Mains Incomer – Voltmeter with selector switch
- b. Ammeter with selector switch
- c. Power Factor meter
- d. Frequency meter
- e. TVM + MD meter
- f. Potential indicating lamps
- g. Outgoing Feeders
- h. Ammeter with selector switch on all feeders

5.3.31 General Technical Specifications of Control Panel

- i. The panel shall be self-supporting, free standing, floor mounted, modular type with construction having degree of protection of IP 54 as per IS 2147.
- ii. The panel shall be fabricated from 14 SWG CRCA sheet steel for frame & load bearing surfaces. Partitions may be fabricated from 16 SWG CRCA if no components are mounted on them.
- iii. The panel shall be painted with 2 coats of primer after pre-treatment and 2 coats of Polyurethane / epoxy paint with shade as decided by the Owner.
- iv. Stiffeners shall be provided at corners & between modules to make panel rugged. The stiffeners will necessarily be required for relay compartments or doors where heavy components are mounted.
- v. The openable covers shall be provided with lift off type hinges, quarter turn door locks and flexible copper wire for earth connection.
- vi. The panel shall be dust and vermin proof. Synthetic or neoprene gaskets shall be provided at all openings.
- vii. The panel shall be of dead front construction suitable for front operated and back maintained functioning.
- viii. Panel shall be provided with fl. lamp of 20 w capacity operated by door operated limit switch. Panel shall also have space heaters and thermostat arrangement.
- ix. Panel shall be provided with 5pin switch socket combined unit of 5/15 Amp capacity.

- x. Lifting hooks shall be provided at the top of the panel.
- xi. The hardware components used in the panel shall be hot dipped galvanized.
- xii. The control components shall be fixed on mounting plate by drilling & tapping.
- xiii. Aluminum anodized legend plates shall be provided for all the components. For components mounted on front face, legend plate from inside shall also be provided.
- xiv. Pretreatment by 7 tank process shall be done before painting / powder coating the panel.
- xv. Panel shall have provision of drawing pocket.
- xvi. The panel shall be designed to ensure maximum safety during operation inspection, connection of cables and maintenance. Inside panel, checking and removal of components shall be possible without disturbing other units.
- xvii. Cable entries will be from bottom. The opening of cable entry shall be covered by 3 mm thick gland plates.
- xviii. The panel shall be provided with all necessary components / devices and instruments as per the enclosed schematic diagram and functional requirements.
- xix. The components such as protective relays, auxiliary relays, push buttons, switches, instruments shall be flush mounted on the front side of a panel.
- xx. The control wiring shall be done with PVC insulated flexible copper wire. For CT secondary circuits 2.5 sq.mm. wire shall be used. For control wiring 1.5 sq.mm. wire shall be used.
- xxi. Earthing busbar of suitable cross section shall be provided throughout the length of panel.
- xxii. The panel shall be fully wired all the terminals shall be brought out for cable connections. 10% spare terminals shall be provided on each terminal block. Separate terminal block shall be provided for different voltages. All wire shall have P.V.C. ferrules as per wiring diagram.
- xxiii. Proper shrouding to incoming and outgoing terminals shall be provided to ensure safety during operation, inspection and maintenance.
- xxiv. Indicating lamps shall be with multiple LEDs & shall be suitable for the voltage specified.
- xxv. All the components in the panel shall be properly labeled. The labels shall be made of non-rusting metal or engraved PVC material properly fixed by screws.
- xxvi. The panel layout shall be made in such a way that it will always facilitate easy removal and reconnection of control cables without disturbing other wiring.
- xxvii. Centre lines of control switches, push buttons and indicating lamps shall be matched so as to give neat appearance. Similarly top lines of indicating instruments and relays shall also be matched.



- xxviii. The panel shall be provided with electrolytic grade aluminum busbar of suitable cross section so as to maintain max current density of 0.8 AMP/ Sq.mm.
- xxix. Bus bars shall be provided with color coded heat shrinkable sleeves.
- xxx. Bus bars shall be supported by high quality epoxy insulators provided at specified distances so as to withstand to the given fault level.
- xxxi. The busbar chambers shall be provided with suitable ventilation arrangements so as to limit the maximum temperature of 85°C while carrying rated current.
- xxxii. Proper clearance of minimum 25 mm shall be maintained between phase bus bars and between bus bars.
- xxxiii. The panel shall be inspected at manufactures works before dispatch to site at the discretion of GIPCL.
- xxxiv. All routine tests shall be carried out on the panel in presence of the Owner / its representative. These tests shall include following:
 - a. Verification of components ratings and operation.
 - b. High voltage measurement test.
 - c. Insulation Resistance measurement.
- xxxv. Control testing.
- xxxvi. Approval on following drawings shall be obtained before manufacturing the panels
 - a. General arrangement drawing.
 - b. Wiring Diagram.
- xxxvii. Detail bill of material.
- xxxviii. 33/66/ kV Overhead power evacuation Transmission Lines

The Contractor shall provide 33/66 kV Overhead Power evacuation transmission lines/ Underground cable / combination of both along with bay and metering on Turnkey basis as per client's requirement for 75 MW (AC) Solar PV Porject. The Bidder shall confirm the same in the Bid. The Conductor along with structures and other accessories for tower shall also be approved registered supplier in GETCO for 75 MW (AC) Solar Project.

a) Conductor

- i) The conductor of appropriate size shall be selected considering power flow requirements and other system considerations.
- ii) The conductors shall be Aluminum Conductor Steel Reinforced (ACSR), All Aluminum Alloy Conductor (AAAC) or Aluminium Alloy Conductor Steel

Reinforced (AACSR) or High Performance conductors (HPC)/ High Temperature and Low Sag (HTLS) conforming to relevant IS/ IEC

b) Earthwire

- i) The earthwire of appropriate size to cater to predicted and design fault currents and lightning shall be used.
- ii) Single earthwire shall normally be used for transmission lines up to 220 kV and two earthwires shall be used for transmission lines of 400 kV and higher voltage classes.
- iii) OPGW along with necessary terminal equipment shall be provided on transmission lines for speech transmission, line protection, and data channels. In addition to OPGW, Power line carrier communication (PLCC) may also be provided, wherever required.
- iv) Bidder shall coordinate with GETCO and ensure the compatibility of OPGW/PLCC equipment at respective ends.

c) Foundation of Transmission Line Towers

Depending upon soil parameters and site conditions, economy and feasibility of construction at site, appropriate type of foundations (viz. open cast, pile, well or other alternative types) shall be considered for transmission line towers

d) Construction of transmission line

- i) Crossing of a transmission line with roads or a railway or a river or a power line or a telecommunication line shall be finalized as per applicable rules & regulations specified by the concerned authorities.
- ii) Crossing of Power lines of 66kV class shall be done with any type of towers (suspension / tension towers) with required body extension to maintain adequate safety clearance.
- iii) Clearances from ground, buildings, roads, power lines, telecommunication lines etc. shall be provided in conformity with Central Electricity Authority (Measures Relating to Safety and Electricity Supply) Regulations, 2010 and as amended from time to time.
- iv) Statutory Clearances, forest clearances in accordance with Forest Conservation Act and guidelines issued by Ministry of Environment, Forest & Climate Change and PTCC Route approval in accordance with CEA regulation/ guidelines (Ministry of

Power) shall be in bidder's scope.

- v) Cables - Wherever construction of an overhead transmission line is not possible due to space constraints or right-of-way problems, XLPE cables conforming to relevant IS/IEC shall be considered for transmission of power.
- vi) Service conditions: Equipment and material to be used in the transmission shall be suitable for satisfactory continuous operation under tropical conditions as specified in the Table below:

Table

| | |
|--|--|
| Maximum ambient temperature (°C) | As per meteorological or climatological data published by Indian Meteorological Department |
| Minimum ambient temperature (°C) | |
| Relative humidity (% range) | |
| Maximum annual rainfall/ snowfall (cm) | |
| Wind zone | As per relevant IS |
| Maximum wind velocity (m/sec) | |
| Altitude above mean sea level (metres) | As per actual |

5.3.32 Metering System

- i. ABT energy meter, Tariff metering CT and PT of required accuracy class, make and specifications shall be provided as approved by GETCO/STU/RLDC to measure the delivered quantum of energy to the grid for sale. The responsibility of arranging for the meter, CT, PT and its inspection/calibration/testing charges etc. rests with the Contractor. All charges incurred on Meter, CT, PT testing, shall be borne by the Contractor. ABT energy metering system is to be approved by GETCO/STU/RLDC. Meter must be provided with the necessary data cables and router, SIM card etc. as per communication requirement of GETCO/STU.
- ii. Separate metering system has to be provided for L.T. (incoming) and H.T. (outgoing) supply.
- iii. The Bidder shall provide ABT compliant meters at the interface points. Interface metering shall conform to the Central Electricity Authority (Installation and Operation Meters) Regulation 2006 and amendment thereof. Commercial settlement of solar Photovoltaic Grid Interactive based power project shall be in accordance with the GERC relevant order. Meter shall be suitable for interfacing for synchronizing the built-in clock of the meter by GPS time synchronization equipment existing at the station either through a synchronization pulse

received from the time synchronization equipment or through a remote PC synchronized to GPS clock shall also be in the scope of Bidder.

- iv. All charges for testing and passing of the meter with relevant government agency shall be borne by Bidder, GIPCL will assist Bidder for necessary document as and when required.
- v. ABT compliant Energy Meters shall have technical specification as given below (not limited to specified requirement, Bidder can provide Meter with latest facilities):
- vi. Shall be microprocessor-based conforming to IEC 60687 / IEC 6205211/ IEC 62053-22 / IS 14697
- vii. Shall carry out four quadrant measurement of active energy (both import and export) and reactive energy (import) by 3-phase, 4 wire principle suitable for balanced/ unbalanced 3 phase load.
- viii. Shall have an accuracy of energy measurement of at least Class 0.2s energy according to IEC 60687, and shall be connected to Class 0.2s CT cores and Class 0.2 VT windings.
- ix. The active and reactive energy shall be directly computed in CT & VT primary ratings of meter on which STU sealing is not done i.e separate meter shall be solely used for GIPCL only.
- x. Shall compute the net MWh and MVARh during each successive (15-minute as per prevailing regulation) block metering interval along with a plus/minus sign, instantaneous net MWh, instantaneous net MVARh, average frequency of each 15 minutes, net active energy at midnight, net reactive energy for voltage low and high conditions at each midnight.
- xi. Each energy meter shall have a display unit with a seven digit display unit. It shall display the net MWh and MVARh with a plus/minus sign and average frequency during the previous metering interval; peak MW demand since the last demand reset; accumulated total (instantaneous) MWh and MVARh with a plus/minus sign, date and time; and instantaneous current and voltage on each phases. ABT meters shall be compatible for future regulatory requirements (e.g. Time Block from 15 minute to 05 minute etc.)
- xii. All the registers shall be stored in a non-volatile memory. Meter registers for each metering interval, as well as accumulated totals, shall be downloadable. All the net active/reactive energy values displayed or stored shall be with a plus /minus sign for export/import.
- xiii. At least the following data shall be stored before being over-written for the following parameters:

Table 5-16 Co-ordination Parameters

| Sr. | Parameters | Details | Min No of Days. |
|-----|---|--------------------|----------------------------------|
| 1 | Net MWh | 15 min Block | 90 days in meter |
| 2 | Average Frequency | 15 min Block | 90 days in meter |
| 3 | Net MVARh for > 103 % | 15 min Block | 90 days in meter |
| 4 | Cumulative Net MWh | At every Mid-night | 30 days in meter / 90 days in PC |
| 5 | Cumulative Net MVARh for v > 103 % | At every Mid-night | 30 days in meter / 90 days in PC |
| 6 | Date and time blocks of VT failure on any phase | | |

- xxxix. Shall have a built in clock and calendar with an accuracy of less than 15 seconds per month drift without assistance of external time synchronizing pulse.
- xl. Date/time shall be displayed on demand. The clock shall be synchronized by GPS time synchronization equipment existing at the station provided by Bidder.
- xli. The meter shall be suitable to operate with power drawn from the VT supplies. The burden of the meters shall be less than maximum 2 VA.
- xlii. The power supply to the meter shall be healthy even with a single-phase VT supply. An automatic backup, in the event of non-availability of voltage in all the phases, shall be provided by a built in long life battery and shall not need replacement for at least 10 years with a continuous VT interruption of at least 2 years. Date and time of VT interruption and restoration shall be automatically stored in a non-volatile memory.
- xliii. Even under the absence of VT input, energy meter display shall be available and it shall be possible to download data from the energy meters.
- xliv. Shall have an optical port on the front of the meter for data collection from either a hand held meter reading instrument (MRI) having a display for energy readings or from a notebook computer with suitable software. . CMRI shall be provided with required software, optical probe, communication cable, data cable, carrying case etc.
- xlvi. Each meter shall have means to test MWh and MVARh accuracy and calibration at site in-situ and test terminal blocks shall be provided for the same.
- xlvi. The meter shall have a unique identification code provided by the Company and shall be permanently marked on the front of the meter and stored in the non-volatile memory of the meter.



- xlvi. The Owner shall have the right to carry out surprise inspections of the Metering Systems from time to time to check their accuracy.
- xlvi. ABT meters shall have minimum 10 years of Guarantee directly to the purchaser (GIPCL)
- xlix. EPC contactor shall finalize the scope of supply of Meters for 220 kV bay/ 66 KV Transmission line with GETCO/STU. If scope of supply is of STU than metering panel shall be proposed and designed to accept meters supplied by STU
 - 1. ABT Meter/s shall be manufactured with specific Serial Numbers allotted by Concerned Authority (GETCO/STU/DISCOM etc). Serial numbers for all meters are to be obtained by EPC contractor.
 - li. Each ABT meters shall be provided with AMR facility (Automated Meter Reading or Remote Metering) with GPS and GPRS Modem, along with its supply adaptor and antenna, software's/ driver etc. Required SIM card of the meters are to be arranged by EPC contractor with one-year subscription.
 - lii. Meter panel shall have provision of dedicated 230 V UPS supply for each meter for future use. UPS supply shall have separate MCB with signaling contact integrated to SCADA
 - liii. Auxiliary supply system of ABT meters are to be monitored (NO Volt relay) in SCADA and local annunciator.
 - liv. In case, time drift correction of more than 1 minute is required, Meter OEM shall extend this facility to GIPCL for the period of three years from the date of commissioning of the meters without any cost to GIPCL. Same shall be given in writing to GIPCL by OEM of the meter.
 - lv. Indication circuit of Tariff metering panel is to be protected with dedicated MCB's.
 - lvi. Metering CT/PT, terminals shall have proper sealing arrangements, preferably with high quality transparent polycarbonate covers.
 - lvii. For 220 KV CT / PT separate / dedicated terminal box shall be provided with temper proof sealing arrangements.
 - lviii. All ABT meters and all CT/PT's are to be tested at approved NABL accredited laboratory in presence of STU/DISCOM and owners representative at appropriate stage without any cost to GIPCL.
 - lix. Site testing and sealing of metering system (ABT meters and CT/PT's, TTB's, Terminal boxes, Panel doors etc.) by concerned authorizes and applicable charges, if any, is in scope of EPC Contractors.
 - lx. Terminal Block Station (TB's) shall have proper sealing arrangements.
 - lxi. Comprehensive memory mapping and documentation (User manual, testing and commissioning manual etc.) of ABT meters to be provided.

- lxii. Required software, equipment's with all accessories for ABT Meter configuration at site shall be provided.
- lxiii. All software's and Meters permanent passkeys (Pass Words) of all level shall be provided.
- lxiv. Instrument transformers burden, ratio, CT secondary amp (1A or 5A) and accuracy limit factors are to proposed by EPC contractor in consultation with concerned authorities at engineering stage.
- lxv. Flush mounted ABT meters are preferred or wall / projection mounting. In case projection mounted / wall mounted type meters are used than the metering panel and mounting of the meter requires special consideration and design.
- Projection / Wall mounted meters are to be installed in the panel in such a way that no part of the meter is projected outside the panel.
 - Wires to Meter terminals TTB etc. shall not be projected outside the panel.
 - Optical port and display of meter, operating control of meters shall be easily accessible for day to day operation.
 - Overall design shall be esthetically very good and highly functional.
 - EPC contractor shall extend fullest co-operation to purchaser for finalization of design of "projection mounting meter" during detail engineering stage.

5.3.33 SCADA and Remote Monitoring System:

General

The 75 MW(AC) Solar Project located at two different geographical region with area distance of approx. 4-5 KM. In one location capacity of project is 50 MW and in second location project capacity is 25MW. The main control room shall be build in 50 MW project location. But for control and monitoring of 25 MW plant real time data shall be transferred and interface in SCADA system of main control room. For this bidder may use armoured optical fiber cable in ring topology, so that single point of optical fiber break shall not affect data transfer from all ICR (Inverter Control Room). Gateway shall be used for transferring data to other than SCADA network.

Data from SCADA of main control room shall be transferred to either SLPP SCADA room (approx. distance 4-5 KM) through redundant armoured optical fiber cable/OPGW or to 66 kV Mosali S/s (approx. distance 10-15 KM) through OPGW cable.



Interfacing/integrating of 75 MW SCADA data to either location shall be in scope of bidder. The supply, installation and commissioning of entire data transfer infrastructure at both end, which include Gateway, optical fiber cable and its accessories, OPGW cable and its accessories, FOTE, FODP/FODF, electronic hardware, software, or any other items (hardware and software) required for establishing data transfer shall be in scope of bidder. Bidder shall submit the data transfer infrastructure technical specification to GIPCL for approval.

The bidder shall visit site to collect information of existing system available there, distance between plots, site conditions etc. so that based on it they can propose a SCADA and data transfer infrastructure for establish end to end communication for control and monitoring of 75 MW Solar Project.

Cyber Security

The cyber security program shall address the following:

- a) Compliance with provisions of the Information Technology Act, 2000 (21 of 2000) and National Cyber Security Policy, 2013 as amended from time to time;
- b) Implementation of the National Critical Information Infrastructure Protection Centre (NCIIPC) Guidelines;
- c) Implementation of guidelines and advisories issued by Computer Emergency Response Team (CERT India) and applicable Sectoral Computer Emergency Response Team (CERT);
- d) Compliance to the Central Electricity Authority (Cyber Security in Power Sector) Guidelines 2021

5.3.33.1 Scope of work for 75 MW (AC) solar project SCADA system shall cover:

- i. Design & Engineering, submission of drawings/documents, manufacture, Factory Acceptance Test (FAT), packing & forwarding, loading, Insurance, transportation, delivery of the SCADA system with HMI system and associated items at each block, supply of mandatory spares, Erection, testing, commissioning of SCADA system and acquisition of solar plant data as well as to provide data in open protocol to GIPCL registered office (Head office, Baroda) / Agency for Scheduling & forecasting (QCA)/ central PC / Server for viewing of 75 MW(AC) solar blocks data at Main Control Room, Stabilization of SCADA



system, providing data to GUVNL as per requirements, training to GIPCL engineers, Warranty/Defect Liability Period services, submission of As-built documents.

- ii. The plant shall be automatically operated and shall be controlled by microprocessor based control system SCADA. There shall be simultaneous data logging, recording and display system for continuous monitoring of data for different parameters of different sub systems, power supply of the power plant at DC side and AC side.
- iii. An integrated SCADA shall be supplied which should be capable of communicating with all inverters and provide information of the entire Solar PV Grid interactive power plant.
- iv. Computer-aided data acquisition unit shall be a separate & individual system comprising of different transducers to read the different variable parameters, A/D converter, multiplexer, de multiplexer, interfacing hardware & software, which will be robust & rugged suitable to operate in the control room Environment.
- v. Reliable sensors for solar insolation, temperature, and other weather and electrical parameters are to be supplied with the data logger unit.
- vi. The data acquisition system shall measure and continuously record electrical parameters at inverter output, 11/33 kV terminal, 33/66/220 KV terminal, 33/66/220 kV ABT meter at evacuation point, ambient temperature near array field, control room temperature, AC and DC side electrical parameters of each inverter, power characteristics of the HT side.
- vii. All data shall be recorded chronologically date wise. The data file should be MS Excel compatible. The data logger shall have internal reliable battery backup and data storage capacity to record all sorts of data simultaneously round the clock. All data shall be stored in a common work sheet chronologically and representation of monitored data shall be in graphics mode or in tabulation form. All instantaneous data can be shown in the Computer Screen. Provision should be available for Remote Monitoring.
- viii. The Bill of Materials associated with the equipment must clearly indicate especially the details about the PC and Printers, etc.
- ix. SCADA panel shall be Rittal make.
- x. The Data Acquisition System should be housed in a desk made of steel sheet.
- xi. SCADA shall provide following data at a 1,,15, 30 and 60 minute interval.
 - a. Power at 66/220 kV ABT meter at switchyard
 - b. Ambient temperature near array field.
 - c. Wind Speed
 - d. AC and DC side Power of each inverter
 - e. Solar irradiation/isolation

- f. Voltage of the HT Side
- g. Any other parameter considered necessary by supplier based on current prudent practice.
- xii. Minimum I/O Consideration as per below table. Any other parameter not mentioned in the list but required as per current prudent practice and GIPCL requirement during detailed engineering shall to be considered& provided at no extra cost .

| Minimum Requirements of SCADA System for I/O Consideration | | | | | | |
|--|------------------------|------------------------|---------------------|---------------------|--------------|------------------------|
| Sr. No. | Equipment Details | Location | SCADA Requirements | | | |
| | | | Monitoring / Status | Control / Operation | Data Logging | Specific Remarks |
| 1 | ABT Meter | 66/220kV Switchyard | Yes | | Yes | |
| 2 | Isolators | 33/66/220kV Switchyard | Yes | | | |
| 3 | C & R | 33/66/220kV Switchyard | Yes | | Yes | Relay Log |
| 4 | Power Transformer | 33/66/220kV Switchyard | Yes | | Yes | Marshalling Box |
| 5 | Breakers | 33/66/220kV Switchyard | Yes | Yes | | |
| 6 | 11kV / 33 kV VCB Panel | MCR | Yes | Yes | Yes | MFM Meters with RS485 |
| 7 | DC Battery Charger | MCR | Yes | | | Battery Back Up Status |
| 8 | UPS | MCR / LCR | Yes | | | UPS Data Log |
| 9 | Aux. Transformer | 66 kV Switchyard | Yes | | | Marshalling Box |
| 10 | Fire Alarm Panel | MCR / LCR | Yes | | | |
| 11 | Inverter | LCR | Yes | Yes | Yes | Inverter Data Log |



| | | | | | | |
|-----------|---------------------------|--------------------------------|-----|-----|-----|--|
| 12 | 33 kV RMU | LCR | Yes | Yes | Yes | MFM Meters with RS485 |
| 13 | Weather Monitoring Status | MCR | Yes | | Yes | |
| 15 | CCTV | LCR / MCR / Plant / Switchyard | Yes | | Yes | NVR based recording & data transmission |
| 16 | String Junction Box | Plant | Yes | | Yes | String Junction Box Level Monitoring |
| 17 | PPC | MCR | Yes | Yes | Yes | PQ meter data, PPC control graphics page, alarm and events, set point assignment, trends |

- xiii. SCADA system Panel hardware shall be with Hot-Redundant CPU, Redundant Communication Module & cables and redundant Power Supply Module with necessary non redundant I/O modules i.e. Digital Inputs, Digital Output, and Analog Inputs hardwired modules. Each channel in each type of I/O modules shall be isolated. Controller and I/O module shall be hot swappable. Minimum 20 % Spare each type I/Os shall be provided and the same shall be wired up to TBs. Time synchronization through Master Clock shall be provided for PLC /SCADA system. All device having real time clock (RTC) with time synchronization facility and are communicating with SCADA shall be synchronized with GPS clock through SCADA or directly with GPS clock (for which any hardware and software required shall be provided). Alarm and hooter shall be provided with HMI.
- xiv. SCADA shall provide 1 minute, 5 minute, 15 minute, 30 minute, 1 Hour, daily, monthly and annual average of following parameters:
- Exported Energy to grid at 66/220 kV
 - PQ meter at 66/220 kV
 - Energy of each inverter



- Solar Radiation
 - Temperature
- xv. SCADA system shall be integrated for 75 MW (AC) Solar Project at Control Room.
- xvi. The PLC/SCADA system shall work satisfactorily without air conditioning in control room without affecting performance of the system.
- xvii. The contractor shall provide warranty of 10 year for entire SCADA and PPC which include hardware and software.
- xviii. Spares and service support letter for SCADA system for 15 Years from date of COD shall be taken from OEM of SCADA system and shall be submitted to GIPCL.
- xix. Minimum 3 (three) nos. Operator cum Engineering stations, 1 (one) nos. Historian & Two laptop shall be supplied for SCADA System for 75 MW (AC) Solar Project. Laptop shall work as EWS with all valid license. All license of SCADA system shall be perpetual. . Details of PC & Laptop configuration shall be submitted for approval. One LED display of 50" shall be provided at the entrance door of the main control room building as per client requirement.
- xx. Hard ware as well as software based Fire wall shall be considered for providing data over internet for proper data security and it should be updated from time to time.
- xxi. The SCADA system shall also have the capability to generate, store and retrieve of user configurable and standard daily/monthly/yearly reports, trends, alarms, Time based & Event based Reports, events. The minimum data storage shall be of 3 years for SCADA System. Report shall be generated as per the Owner's requirement and also in the format i.e. Excel or PDF of text as per requirements.
- xxii. Contractor shall provide the licensed System software, PC Operating System and System specific software, if any. Minimum 20 % Spare points / tags shall be considered for future provision.
- xxiii. All Key (s), passwords & License(s) shall be handed over to GIPCL.
- xxiv. PLC Supplier shall develop the Logics/Program, required logic modifications as per System / Plant and the Owner's requirement at site, without any cost implication to GIPCL.
- xxv. The network printer shall be of industrial type, rugged & robust in nature and of reputed make. The network printer shall be equipped for printing, scanning and copying.
- xxvi. Contractor shall provide a Package/Split AC of suitable capacity decided by load requirement in SCADA Main control/CMCS room. All the power supply module, Ethernet

switches and network accessories for non-air conditioned area shall be suitable for operating in ambient temperature of 50 Deg C minimum.

- xxvii. Power plant controller (PPC) shall be provided with two processors (main processing unit and memories), one for normal operation and one as hot standby. In case of failure of working PPC processor, there shall be an appropriate alarm and simultaneously the hot standby PPC processor shall take over the plant control function automatically. The transfer from main processor to standby processor shall be totally bump less and shall not cause any plant disturbance whatsoever. It shall be possible to keep any of the PPC processors as master and other as standby. The standby processor shall be updated in line with the changes made in working processor. The solar plant SCADA and PPC networks shall be suitably designed, so that PPC shall directly and independently able to control the individual solar inverter. PPC will take input for control and monitoring from Class A PQ meter installed at 66/220kV. PQ meter time shall be synchronized with GPS clock. PQ meter shall have 0.2s accuracy measurement. Number of PQ meter required shall be finalized during detailed engineering. PQ meter supply and commissioning is in scope of bidder. Detailed control logic in the PPC shall be finalized during detailed engineering stage. Bidder shall submit generic model of PPC in PSCAD.
- xxviii. The control system shall provide safe operation under all plant disturbances and on component failure so that under no condition safety of plant, personnel or equipment is affected. Control system shall be designed to prevent abnormal swings due to loss of Control System power supply failure, failure of any control system component, open circuit/ short circuit. On any of these failures the controlled equipment/parameter shall remain in last position before failure or shall come to fully open/close or on/off state as required for the safety of plant/personnel/equipment and as finalized during detailed engineering. System shall be designed such that there shall be no upset when power is restored. These operations shall be demonstrated by Contactor during Factory Acceptance Test (FAT) in presence of GIPCL representative.
- xxix. Programming of the PLC Processor/controller as well as programming of HMIS shall be user friendly with graphical user interface and shall not require knowledge of any specialized language.
- xxx. The Contractor shall provide training for operation, maintenance and programming of SCADA and PPC and shall provide all necessary training material to Owner / GIPCL at no cost.

xxxi. All the SCADA Software with license Key shall be handed over to GIPCL on the DVD/CD/Pendrive media. All the hardware and software shall be licensed to GIPCL.

xxxii. FACTORY ACCEPTANCE TEST (FAT) procedure shall be submitted by bidder for GIPCL approval and after approval of FAT procedure, FAT will be witnessed by GIPCL Engineering or authorized representative of GIPCL. SCADA shall communicate with all third party devices which are part of Solar Plant and the same shall be demonstrated during the FAT.

xxxiii. SCADA Controller System

The SCADA at main control room shall be PLC/DCS/RTU based and for Inverter Control Room PLC/IO module/RTU.

1. SCADA and PPC shall have facility for implementation of all logic functions for control, protection and annunciation of the equipment and systems.
2. Main control room SCADA and PPC shall be provided with two processors each having main processing unit and memories. One shall be in normal operation and other shall be hot standby. In case of failure of working processor, the hot standby processor shall take over the complete plant operation automatically. Failure of working processor shall be alarmed in SCADA. The transfer from working processor to hot standby processor shall be bumpless and not cause any plant disturbance whatsoever. In event both processor, the system shall revert to fail safe mode. It shall be possible to keep any of the processor as master and other as hot standby. The hot standby processor shall be updated in line with the changes made in working processor.
3. The memory shall be field expandable. The memory capacity shall be sufficient for the complete system operation and have capability for at least 20% expansion in future. Programmed operating sequences and criteria shall be stored in non volatile semiconductor memories like EPROM. All dynamic memories shall be provided with buffer battery backup for at least 360 hours. The battery shall be lithium or Ni-Cd type.
4. A forcing facility shall be provided for changing the status of input and outputs, timers and flags to facilitate fault and other testing requirements. It shall be possible to display the signal flow during operation of the program.

xxxiv. SCADA Communication System

The data communication system shall include a redundant Main system Bus with hot back up.



1. Redundant communication controllers shall be provided to handle the communication between IO modules (including remote IO) and PLCs and between PLCs and operator work station.
2. The designing shall be such as to minimize interruption of signals. It shall ensure that single failure anywhere in the media shall cause no more than a single message to be disrupted and that message shall automatically be retransmitted. Any failure or physical removal of any station/module connected to the system bus shall not result in loss of any communication function to and from any other station/module.
3. If the system requires master bus controller philosophy, it shall employ redundant master bus controller with automatic switchover facility.
4. Build in diagnostic shall be provided for easy fault detection. Communication error detection and correction facility shall be provided at all level of communication. Failure of one bus and change over to the standby system bus shall be automatic and completely bumpless and the same shall be alarmed and logged.
5. Data transmitting speed shall be sufficient to meet the responses of the system in terms of displays, control etc plus 25% spare capacity shall be available for future expansion.
6. CAT 6 UTP or fiber optic cable shall be used. Within panel unarmoured CAT6 shall be used but outside panel i.e trench etc shall be armored CAT6 cable.
7. The contractor shall furnish details regarding the communication system like communication protocol, bus utilization calculation etc
8. Contractor shall set up Gigabit ethernet based plant local area network (LAN) to connect different communication nodes at Inverter Control Station RTU panel with redundant backbone using ring topology or better.

xxxv. Human Machine Interface (HMI)

1. HMI shall be built with latest state of art servers/workstations with open architecture supporting OPC/TCP/IP protocols etc.
2. The SCADA shall be OPC version 2.05a compliant and implemented a OPC DA 2.05a server as per the specification of OPC foundation. All data should be accessible through this OPC servers.
3. The OWS shall perform control, monitoring and operation for plant equipment connected with SCADA.



4. EWS shall work as a programmable station both for Controller and SCADA. It shall be possible to use same EWS as programming station and Human Interface System (HMI).
5. SCADA system shall be provided with redundant OWS. Operator shall be able to access all control/information related data under all operating conditions.
6. Two nos of Laptop shall also work as EWS with full license.
7. The miminc shall be configured on the HMI.
8. The SCADA system shall have ability to perform operator function for each OWS as a minimum , including Control System Operation (A/M), raise/lower, setpoint/bias change, on/off, open/close operation, mode/device selection, bypass criteria, sequence auto, start/stop selection, drive auto selection, local/remote/other multi-position selection, alarm acknowledgement, call any kind of display, logs, summaries, calculation results etc; printing of logs and reports, retrieval of historical data; any other function required for smooth operation and control and management of information as finalized during detailed engineering.
9. The display selection process shall be optimized so that the desired display can be selected with the minimum no. of operations. Navigation from one display to any other should be possible efficiently through paging soft keys as well as through targets defined on the displays. There should be no limitation on number of such targets.
10. The system shall have built-in safety features that will allow/disallow certain functions and entry fields within a function to be under password control to protect against inadvertent and unauthorized use of these functions. Assignment of allowable functions and entry fields shall be on the basis of user profile. The system security shall contain various user levels with specific rights as finalized by the Employer during detailed engineering. However, no. of user levels, no. of users in a level and rights for each level shall be changeable by the programmer (Administrator).
11. In addition to OWS one LED screen of 50" size shall be provided to connecting in office/conference room or as per Owner requirement.
12. System shall be provided with suitable network firewall .
13. Programming of PLC processor/controller as well as programming of HMI shall be user friendly with graphical user interface (Flow chart or block logic or ladder diagram etc) and shall not require knowledge of any specialized language.



14. The programming of HMI (like development and modification of data base, mimics, logs / reports, HSR functionalities etc.) shall also be possible through user-friendly menus etc.
15. All programming facilities shall be password protected to avoid un authorized modification.

xxxvi. Software Requirement

1. All necessary software required for implementation of control logic, operator station dispalys/logs, storage & retrival and other functional requirement shall be provided. The program shall include high level languges as far as possible. The contractor shall provide suffiecent documents and programming list so that it is possible for the Owner to carry out modification at a latter date by their own.
2. The contractor shall provide all software required by the system for meeting the intent functional/parametric requirement of the specification.
3. Industry standard operating system like WINDOWS (latest version) etc. To ensure openness and connectivity with other system in the industry.
4. SCADA system shall include the following standard protocols as a minimum:
 - a) Modbus (TCP/IP, RTU, ASCII).
 - b) Sub Station Protocol (IEC-61850 and IEC 60870 -5-101/104).

Any other protocol on which the offered equipment (by contactor) will communicate with SCADA.

5. All system related software including Real Time Operating System, File management software, screen editor, database management software, On line diagnostics/debug software, peripheral drives software and latest versions of standard PC-based software, Antivirus software and latest WINDOWS based packages (MS Word, Excel and Power Point) etc. And any other standard language offered shall be furnished as a minimum.
6. All application software for SCADA system functioning like input scanning, acquisition, conditioning processing, control and communication and software for operator interface of monitors, displays, trends, curves, bar charts etc. Historical storage and retrieval utility, and alarm functions shall be provided.

7. The Contractor shall provide software locks and passwords to Employer's engineers at site for all operating & application software so that Employer's engineers can take backup of these software and are able to do modifications at site.
8. The Contractor shall provide software license for all software being used in Contractor's System. The software licenses shall be provided for the project (e.g. organization or site license) and shall not be hardware/machine-specific. That is, if any hardware/machine is upgraded or changed, the same license shall hold good and it shall not be necessary for Employer to seek a new license/renew license due to up gradation/change of hardware/machine in Contractor's System at site. All licenses shall be valid for the continuous service life of the plant.
9. All the SCADA Software with license Key shall be handed over to GIPCL on the DVD/CD/Pendrive media. All the hardware and software shall be licensed to GIPCL.

xxxvii. Parametric Requirements

The control system shall be designed such that under worst case loading conditions the response time shall not be worse than the following:

1. On/OFF Command : The response time for screen update after execution of control command from the time the command is issued shall be one second (excluding the drive actuation time).
2. Adjustment Command: 0.5 to 1 second
3. On screen updating and all control related displays: 1 second
4. Bar chart displays, Plant Mimic displays, Group review displays, X-T plot displays and Plant summary displays : 1 to 2 second
5. All the analog data shall be scanned at resolution of 1 second and refreshing on screen however, recording of data shall be as finalized during detailed engineering.

xxxviii. Technical Specification for Network Firewall

These are minimum features additional feature shall be finalized during detailed engineering

| Technical Requirements for Network Firewall | | |
|---|-------------------------------|--|
| Sr .NO | Feature | Required Parameter |
| A | General | |
| 1 | Common criteria certification | The offered product series or its operating system series must have achieved EAL (Evaluation Assurance Level) certification of EAL4 or higher in the common criteria for |

| | | |
|---|--|---|
| | | Information Technology Security Evaluation(ISO/IEC 15408) for computer security evaluation . |
| 2 | Architecture | The firewall shall be a purpose build hardware application based next generation firewall (NGFW) solution having application awareness & intrusion prevention function. |
| 3 | End of sale | OEM end of sale declaration shall not have been released for the offered model at the time of bid submission |
| B | Hardware Specification & Performance Parameter | |
| 1 | Firewall Interfaces | Minimum four or as required nos of gigabit 10/100 base T Ethernet ports to be provided |
| | | Provision of addition of at least Two Nos of gigabit fiber SFP ports shall be available |
| | | Each port must be configurable flexibly in any security zone as per the requirement without any fixed zone assignments |
| | | All the above specified interfaces shall be firewall interfaces. Internal Switch interfaces shall not be considered. |
| | | The firewall shall not have any wireless interfaces |
| 2 | Security Zones | At least four security zones must be supported |
| C | Firewall Inspection | |
| 1 | Application Support for Inspection | Should support Standard Protocols |
| | | Internet based applications like Telnet, FTP, SMTP,http, DNS,ICMP etc. Should be supported for filtering |
| | | Internet web 2.0 application and widgets |
| 2 | NAT & PAT | Dynamic NAT as well as one to one NAT |
| | | Port/IP Address Forwarding |
| | | PAT |
| 3 | Resistance to Evasion | The firewall shall be able to detect and block evasion techniques including SYN flood, address spoofing and TCP split handshake etc. |
| D | Application awareness | |
| 1 | | Firewall should support detection of application regardless of port, protocol etc |

| | | |
|---|--|--|
| | Application intelligence and control | <p>Firewall must identify and control applications sharing the same session</p> <p>The firewall should allow creation of securities policies to identify, allow, block or limit an application regardless of port, protocol etc</p> |
| E | Intrusion Prevention System (Integrated with firewall) | |
| 1 | General | <p>The IPS must provide intrusion prevention functionality out of the box</p> <p>The IPS should be capable of accurately detecting intrusion attempts and discern between the various types and risk levels, including unauthorized access attempts, pre-attack probes, suspicious activity, vulnerability exploitation etc</p> <p>The IPS should provide protection from Advanced Botnets, inbound and outbound</p> <p>The IPS should use stateful detection and prevention techniques and provide zero day protection against worms, Trojans, Spyware, Keyloggers and other malware from penetrating the network</p> |
| 2 | Detection Methods | <p>The offered solution should use the following methods for detection of malicious traffic:</p> <p>Signature based detection</p> <p>Statistical Anomaly based detection</p> |
| 3 | Threat Intelligence and signature updates | The IPS OEM should have a 24X7 security service update and should support real time signature update of the system as soon as updates are released |
| 4 | Exception List | The IPS should support the creation of Access Control List to bypass the inspection of any specific flow |
| 5 | DoS/DdoS protections | The offered solution should be capable of preventing Denial of service and distributed denial of service attacks |
| 6 | Threat Control Features | <p>The offered solution should provide the following security features:</p> <p>Detection and blocking malicious web traffic on any port</p> |

| | | |
|---|------------------|---|
| | | Capability of detecting attacks within protocols independent of port used |
| | | IPS sensor should allow the admin to create IPS policies on the basis of IP address and range |
| 7 | Signature Tuning | The offered solution should allow enabling/disabling of each individual signature. Each signature should allow granular tuning to suit user requirement |

xxxix. Historical Storage and Retrieval System (HSRS)

1. The HSRS shall collect, store and process data from the Data base. The data shall be saved online on hard disk and automatically transferred to the non erasable long term storage media once in every 30 Days periodically for long term storage. Provision shall be made to notify the operator when hard disk is certain percentage full.
2. The data to be stored in the above system shall include alarm and event list, periodic plant data, reports, logs, trends etc.
3. The system shall provide user friendly operator functions to retrieve the data from historical storage. It shall be possible to retrieve the selected data on OWS in form of trend/report by specifying date, time and period. Further, suitable index file/directories shall also be provided to facilitate the same.
4. In addition to above, the system shall also have facility to store and retrieve important plant data for a very long duration on portable external long term storage media. Bidder shall provide two number of portable external hard drive of 2 TB each.
5. For long term plant performance analysis, the following plant data as a minimum with time stamping and interval as indicated in below table but not limited to shall be stored daily on historian.

Important plant data for a very long duration (plant life) storage on historian

| Sr.No | Parameter | Time Interval |
|-------|--|---------------|
| 1 | Weather Monitoring Station data: Global Horizontal Irradiance, Global Inclined Irradiance and Diffused Horizontal Irradiance, Ambient temperature, Module Temperature, Wind speed, Wind Direction, Rainfall and Relative Humidity | 1(one) Minute |

| | | |
|---|---|------------------------|
| 2 | Calculated daily Global Horizontal Insolation, Global Inclined Insolation and Diffused Horizontal Insolation | 24 (Twenty Four) Hours |
| 3 | Power Conditioning Unit (PCU): DC Voltage, DC power, DC current, SMB current , AC Active & Reactive Power, Power Factor, Ac Current & Voltage, energy, Inverter ambient and IGBT stack temperature | 1(one) Minute |
| 4 | MFMM, energy meter and Numeric Relay data: Active and Reactive Power, Energy (day), Current and Voltage | 1(one) Minute |
| 5 | Export feeders Energy Meter Data: Active and Reactive power, Energy Import and Export, Current, Voltage and Grid Frequency | 1(one) Minute |
| 6 | Daily Energy export from each Inverter | 24 (Twenty Four) Hours |
| 7 | Total Sum of daily energy export from all inverter | 24 (Twenty Four) Hours |

xl. System Spare Capacity

Over and above the equipment and accessories required to meet the fully implemented system as per specification requirements, Control System shall have spare capacity and necessary hardware/equipment/accessories to meet the following requirement for future expansion at site:

1. 20% spare channels in input/output modules fully wired up to cabinets TB.
2. Wired in “usable” space for 20% module in each of the system cabinets for mounting electronic module wired upto the corresponding spare terminals in the system cabinets.
3. Empty slot between individual modules/group of modules, kept for ease in maintenance or for heat dissipation requirement as per standard practice of the contractor shall not be considered as wire in “usable” space for I/O modules.
4. Terminal assemblies (if any offered) corresponding to the IO module shall be provided for above mentioned 20% blank space.



5. Each processor/controller shall have 20% spare functional capacity to implement additional functional blocks, over and above implemented logic/loops. Further, each processor/ controller shall have spare capacity to handle minimum 20% additional input/output for each type including above specified spare requirements, over and above implemented capacity. Each of the corresponding communication controllers shall also have same spare capacity as that of processor/controller.
6. The data communication system shall have the capacity to handle the addition mentioned above.
7. 20% spare relay of each type and rating mounted and wired in the cabinets TB. All contact of relay shall be terminated in the terminal block of the cabinet.
8. The spare capacity as specified above shall be uniformly distributed through out the cubicles. The system design shall ensure that above mentioned addition shall not require any additional controller/processor/peripheral drives in the system delivered at site. Further, these additions shall not deteriorate the system response time/duty cycle, etc. From those stipulated under this specification.

xli. SCADA Hardware

1. The SCADA shall be based on latest state of art Workstations and servers and technology suitable for industrial application and power plant environment.
2. The workstation/servers employed for SCADA implementation shall be redundant based on industry standard hardware and software which will ensure easy connectivity with other systems and portability with third party software.
3. Redundant sets of communication controllers shall be provided to handle all the communication between SCADA and redundant system bus and to ensure specified system response time and parametric requirement. Each communication controller shall have message checking facility. Power Fail Auto Restart facility within automatic time update shall be provided.
4. All the peripherals shall conform to the following minimum requirement but the exact make and models shall be approved by Owner during detailed engineering. The LAN to be provided under SCADA shall support TCP/IP protocol (Ethernet connectivity) with OPC RDI for interface with PLCs/other systems and shall have data communication speed of min 100 MBPS. All network components of LAN and workstation shall be compatible to the LAN, without degrading its performance. Engineering workstation(EWS)/Operator Workstation (OWS)/Historian/Laptop

| Sr.No | Features | Required Parameter |
|-------------|--|--|
| 1 | Processor | EWS/OWS: 64 bit server grade (Xeon or equivalent), octacore minimum Others : 64 bit , I5 or higher |
| 2 | Memory | EWS/OWS: 16 GB RAM upgradable upto 24 GB minmium Others: 8 GB RAM upgradable upto 16 GB |
| 3 | Hard Disk | EWS/OWS and Historian: 1 TB with RAID 5 Others: 500 GB with RAID 5 |
| 4 | Communication port | EWS/OWS: 2 serial bus Expansion slot=2 Others : 4 serial bus, Expansion slot=2 Laptop: 2 serial Bus |
| 5 | Monitor (color) | 42" LED flat monitor non interface refresh rate min 75 Hz, graphic memory 16 MB |
| 6 | Removable Bulk Storage Drive | 2 TB (minimum) |
| 7 | Network Connectivity | EWS/OWS: 4 nos built in ethernet network port Others: 2 nos built in ethernet network port Laptop : 1 nos built in ethernet network port and 1 no wifi |
| 8 | DVD R/W | 16X or higher for EWS and OWS |
| 9 | Keybaord | ASCII |
| 10 | Pointing Device | Mosue |
| 11 | Additional general purpose software (for using over network by server/workstation/Pcs) | Comprehensive disk maintenance utility for disk clean sweep/crash guard/antivirus etc |
| 12 | Software | MS Windows latest, MS office Editor (Excel, Word, Power Point), Adobe Acrobat, Antivirus , Network security , etc |
| LED Display | | |

| | | |
|---|--|--|
| 1 | LED Display | 50 Inch LED Display, Display resolution 1920X1080, Wall mounted, Reputed make (Samsung, Sony/LG or equivalent) |
| Printer – Networked Color Laser Printer | | |
| 1 | Paper Size | A3 |
| 2 | Printing speed (min) in normal mode for A4 size paper | 6 ppm (color) |
| | | 24 ppm (B&W) |
| 3 | Type | Heavy duty, at least 50000 pages/month |
| 4 | Resolution (black – min) | 600 dpi |
| 5 | First page out time with full graphic display | =< min for color |
| | | < 45 second for BW |
| 6 | Paper sheets (1ream=500 sheets) with printer (to be supplied with printer) | 5 ream (A3) |
| | | 10 ream (A4) |
| 7 | Scan and copy function | Yes, required |

xlii. Weather Station and Data logger

- Contractor shall provide the data over remote web-server with rights to control or modify the same through appropriate arrangements.
- Contractor shall provide necessary licensed software and hardware solution to offer monitoring of electrical parameters of grid and solar generator monitored at individual string level over remote web server. The Contractor shall provide all necessary accessories like power supply, connection cords, sensors, active SIM card with appropriate data plan etc. so as to make the system complete in all respect.
- The cost of data plan during the project and O&M shall be borne by the Contractor. At the end of the O&M, the same shall be transferred to GIPCL at no extra cost.
- It shall also have local data logging and communication through Bluetooth / Wi Fi and Ethernet port.

- e. The Remote Monitoring System shall be capable of sustaining maximum – minimum temperature, rainfall, wind gusts and UV radiation. The enclosure shall be IP65 for outdoor installation / IP21 for indoor installation.
- f. The Remote Monitoring System shall have capability to log and send data from weather sensors.
- g. The data shall be available for report every minimum 1,5,15,30 and 60 minutes interval. For display on SCADA screen real time data shall be made available.
- h. The system shall have sufficient internal memory storage to retain data for one complete year and shall have provision of expanding memory through external memory card / USB drive.
- i. The system shall be able to communicate wirelessly in a close proximity
- j. The Contractor shall provide to the Owner the detailed specifications, and all administrative rights/ privileges / passwords to the string monitoring system.
- k. The Contractor shall provide following measuring instruments with all necessary software & hardware compatible with the Data logging and web-based monitoring system for 75 MW (AC) Solar PV Power Project.
 - i. **Pyrometer:** For 75 MW (AC) solar project, the Contractor shall provide total three nos. of pyranometers (Three nos. GHI and One no GTI / Plane Irradiance). The pyranometers shall have following specifications mentioned in Table 5-.

Table 5-17 Specification of Pyranometers

| Sr. | Particulars | Specification |
|-----|-----------------------------------|-----------------------------|
| 1 | Class | II |
| 2 | Spectral Response | 0.31 to 2.8 micron |
| 3 | Sensitivity | Approx. 9 micro - volt/w/m2 |
| 4 | Time response (95%) | Max 15 sec. |
| 5 | Non linearity | ±0.5% |
| 6 | Temperature Response | ±2% |
| 7 | Temperature Response | Max ±2% |
| 8 | Tilt error | ±0.5%. |
| 9 | Zero offset thermal radiation | ±7 w/m2 |
| 10 | Zero offset temperature change | ±2 w/m2 |
| 11 | Operating temperature range | - 40 deg. to +80 deg. |
| 12 | Uncertainty(95% confidence Level) | Hourly- Max-3% |
| 13 | Daily- | Max -2% |
| 14 | Non stability | Max ±0.8% |

| | | |
|-----------|--|---|
| | | |
| 15 | Resolution | Min + / - 1 W/m ² |
| 16 | Input Power for Instrument & Peripherals | 230 VAC (If required) |
| 17 | Output Signal | MODBUS RTU or Analogue form which is compatible with the data |

- ii. **Temperature Sensor:** The Contractor shall provide suitable nos. of RTD type temperature sensors with required weather shield as per Indian Standards, so as to individually and simultaneously measure both, ambient temperature, and module temperature. To measure module temperature, the temperature sensors shall be located on the back of representative modules and on front glass surface. Care must be taken to ensure that the temperature of the cell in front of the sensor is not substantially altered due to the presence of the sensor. Instrument shall have a range of -5°C to 60°C.
- iii. **Anemometer and Wind Vane:** The Contractor shall provide double cup anemometer on tubular type made up of hot dipped Galvanized Iron. Velocity range upto 65 m/s, accuracy limit of 0.1 m/s. the anemometer shall have valid calibration certificates which should be produced during one month of the installation.
- iv. Each instrument shall be supplied with necessary cables. Calibration certificate with calibration traceability to World Radiation Reference (WRR) or World Radiation Centre (WRC) shall be furnished along with the equipment. The signal cable length shall not exceed 20m. Bidder shall provide Instrument manual in hard and soft form.
- v. The data acquisition system shall measure, continuously record power at PV module ambient temperature near array field, cell temperature, wind velocity, AC and DC (string level) side power of each inverter, power characteristics of the HT side, fault messages, alarms etc. in Indian Standard Time.
- vi. Reliable sensors for solar insolation, temperature & other weather & electrical parameters are to be supplied with data logger unit.
- vii. All data shall be recorded chronologically date wise. The data file should be MS Excel compatible. The data logger shall have internal reliable battery backup and data storage



capacity to record all sorts of data simultaneously round the clock. All data shall be stored in a common work sheet chronologically. Representation of monitored data in graphics mode or in tabulation form. All instantaneous data can be shown in the Computer Screen.

- viii. Provision should be available for Remote Monitoring and Data Retrieval over web server. Moreover, Successful Bidder shall also provide minimum 3 (three)nos. Operator cum Engineering stations & two laptop with required hardware and licensed copies of software to make it fully functional for normal operation and data logging through Bluetooth / Wi Fi / RS port from the site.
- ix. The Bill of Materials associated with the equipment must clearly indicate especially the details about the PC and other accessories.
- x. The Data Acquisition System should be housed in appropriate enclosure to sustain outdoor environment as per generation design guidelines laid for enclosures. The same shall have provision of locking the same to prevent unauthorized operation. Remote Monitoring System (RMS) shall provide following data at a 15 minute interval.
- Power, Current and Voltage at individual solar PV strings (Instantaneous)
 - Ambient temperature near array field, cell temperature measured at module front and back surface
 - Wind Speed
 - Cumulative AC and DC side Power of each inverter
 - Cumulative AC and DC energy of each inverter
- a. Solar irradiation/isolation over horizontal and in-plane of the module
- b. Voltage, frequency and other important electrical parameters etc. in the local grid.
- c. Any other parameter considered necessary by supplier based on current prudent practice
- d. RMS shall have feature to be integrated with the local system as well remotely via the web using either a standard modem or a GSM/WIFI modem. The Bidder shall provide compatible software and hardware so that data can be transmitted via Standard modem.
- e. RMS shall be provided with independent solar PV based power supply along with maintenance free battery having 3 days autonomy.
- f. The RMS shall be compatible to the requirements for measuring and reporting the performance-ratio of the power plant.

- g. The contractor shall provide all administrative rights/ privileges/ passwords of the RMS system to GIPCL.
- h. The Bidder shall submit the data sheet with technical specifications of the RMS system in the Bid.

xliii. Cyber Security Technical Specification:

The system supplied shall comply the cyber security guidelines issued by the Central Government from time to time, and to the technical standards for communication system in Power sector laid down by the Authority.

- 1) The architecture for control system shall be designed with security such that it is important that the selection process ensures that the level of protection is commensurate with the business risk and the system security shall not rely on one single security measure for its defence. (*Reference IEC/TR62351-10 Edition1.0 2012-10 Power systems management and associated information exchange –Data and communications security – Part 10: Security architecture guidelines*).
- 2) There is hard isolation of OT (Operational Technology) system from any internet facing IT system.
- 3) If required only one OT system shall be provided with internet and it shall be isolated from all OT zone and kept in separate room under control and security of CISCO.
- 4) Power-Tel internet/broadband shall be used. Communication channel security configuration shall be done.
- 5) Downloading/Uploading of any data/information from their internet facing IT system is done only through an identifiable whitelisted device followed by scanning of both for any vulnerability/malware as per the SOP laid down and for all such activities digital logs are maintained and retained under the custody of CISO for at least 6 months. The log shall be readily to carry out the forensic analysis if asked by investigation agency.
- 6) List of whitelisted IP addresses for each firewall shall be provided and each firewall is configured for allowing communication with the whitelisted IP addresses only.
- 7) Bidder shall leverage state-of-art cyber security technologies and relevant processes at multiple layers to mitigate the cyber securities risks
- 8) The bidder shall identify and document the Electronic Security Perimeter(s) and all Access Points to the perimeter(s) as per IEC 62443 / IS16335 (as amended from time to time).



- 9) Bidder shall ensure that every Critical System resides within an Electronic Security Perimeter.
- 10) Bidder shall perform a cyber-Vulnerability Assessment of each electronic Access Points to the Electronic Security Perimeter(s). Bidder shall ensure that all vulnerabilities identified as a result of cyber Vulnerability Assessment shall be closed. If a Cyber Asset is found vulnerable to any exploits or upon any patch updates or major configuration changes, then further Penetration Testing may be carried out offline or in a suitably configured laboratory test-bed to determine other vulnerabilities that may have not been identified so far. Bidder shall submit the report to Owner.
- 11) System supplied by bidder has deployed an Intrusion Detection System and Intrusion Prevention System capable of identifying behavioural anomaly in both IT as well as OT Systems. Bidder shall share reports on incident response and targeted malware samples Owner.
- 12) All Firmware/Software with digital sign of O.E.M shall only be updated in the system.
- 13) The system shall have 6 (six) month firewall log. Firewall log shall be analysed and all critical high severity comments shall be closed immediately.
- 14) System shall maintain all cyber logs and cyber forensic records of any incident at least 90 days from the date of the commissioning of the system/recovery from any incident, whichever is later.
- 15) Bidder shall ensure that all the Communicable Intelligent Equipment and the Service Level Agreements (SLAs) for their Critical Systems shall be sourced from the list of the "Trusted Sources" as and when drawn by MoP/CEA.
- 16) Bidder shall ensure that, in case, for the any Communicable Intelligent Devices, if no Trusted Source has been identified, then it shall have compliance with the provisions made in MoP order dated 2.7.2020 and any other relevant MoP order has got the product cyber tested for any kind of embedded malware/Trojan/cyber threat and for adherence to Indian Standards at the designated lab.
- 17) Bidder shall ensure that all Cyber Assets being procured shall conform to the type tests as mentioned in the specification for type testing listed in the bid document. Type test reports of tests conducted in NABL accredited Labs or internationally accredited labs (with in last 5 years from the date of bid opening) shall be mandated to be submitted along with bid. In case, the submitted Type Test reports are not as per specification, the re-tests shall be conducted without any cost implication to the Owner.



- 18) Bidder shall ensure that all Communicable devices are tested for communication protocol as per the ISO/IEC/IS standards listed in MoP Order No. 12/13/2020-T&R dated 8th June, 2021(Annexure-B).
- 19) Bidder shall ensure that all Critical Systems designed with Open Source Software are adequately cyber secured.
- 20) FAT, SAT must include comprehensive cyber security tests of the component/equipment/system to be delivered/delivered at site. Bidder shall ensure that the essential cyber security tests are carried out successfully during FAT, SAT as detailed in Annexure A. The equipment/System besides for functionality shall also be tested in the factory for vulnerabilities, design flaws, parts being counterfeit or tainted, so as to minimize problems during on-site testing and installation. Cyber Security Conformance Testing are to be carried out in the designated Lab as listed in Annexure-I of MoP Order No. 12/13/2020-T&R dt. 8th June, 2021(Order at Annexure-B).

Documents required from Bidder during detailed engineering

- 1) Details of Cyber Assets which uses a routable protocol to communicate outside the Electronic Security Perimeter drawn by the Responsible Entity or a routable protocol within a control centre and dial-up accessible Cyber Assets.
- 2) Details of Critical Business Processes and underlying information infrastructure along with mapped impact and Risk Profile.
- 3) Document Format for FAT, SAT test results and report/ certificate of cyber tests carried out for compliance of Government Orders and Cyber Security Audit. FAT, SAT must include comprehensive cyber security tests of the component/equipment/system to be delivered/delivered at site.
- 4) Bidder shall submit Equipment/System certificate obtained by OEM from a certification body accredited to assess devices and process for conformance to IEC 62443-4 standards during design and manufacture and ISO/IEC 15408. This certificate shall be in line with the Testing Protocol as notified by Ministry of Power, Government of India, from time to time.

Testing of System



Bidder shall ensure that the essential cyber security tests are carried out successfully during FAT, SAT as detailed in **Annexure A**. The equipment/System besides for functionality shall also be tested in the factory for vulnerabilities, design flaws, parts being counterfeit or tainted, so as to minimize problems during on-site testing and installation. Cyber Security Conformance Testing are to be carried out in the designated Lab as listed in **Annexure-I of MoP Order No. 12/13/2020-T&R dt. 8th June, 2021(Order at Annexure-B)**.

Annexure A

FAT & SAT

1. During FAT stage, Owner shall verify all types test reports / certificates including Communication protocol and security conformance tests of the devices offered for FAT.
2. FAT of SCADA involves testing as a whole system in the integrated scale down set up. For SCADA, Indian standard IS 15953: 2011 “SCADA System for Power System Applications” provides definition and guidelines for the specification, performance analysis and application of SCADA systems for use in electrical utilities (for transmission & Distribution) including guidance on Tests and inspections.
3. The SAT will be done at Owner site as per the SAT document mutually agreed by Owner and Bidder. For SAT also, guidance from IS 15953: 2011 need to be applied.
4. IEC 61850-10-3 Communication Networks and Systems For Power Utility Automation- Functional testing of IEC 61850 systems (in draft stage - CDTR) covers testing of applications within substations covering
 - a. A methodical approach to the verification and validation of a substation solution
 - b. The use of IEC 61850 resources for testing in Edition 2.1
 - c. Recommended testing practices for different use cases
 - d. Definition of the process for testing of IEC 61850 based devices and systems using communications instead of hard-wired system interfaces (ex. GOOSE and SV instead of hardwired interfaces)
 - e. Use cases related to protection and control functions verification and testing.

Cyber Security Training

The Responsible Entity shall ensure that Cyber Security training program designed for Owner must include following topics and as per their functional requirements and security concerns additional topics shall be added:

- 1) User authentication and authorization.
- 2) Cyber Security and Protection mechanisms of IT/OT/ICS Systems.
- 3) Introduction to various standards i.e. ISO/IEC:15408, ISO/IEC:24748-1, ISO: 27001, ISO: 27002, ISO 27019, IS 16335, IEC/ISO:62443.
- 4) Training on implementation of ISO/IEC 27001 and awareness on IEC 62443.
- 5) Vulnerability Assessment in the Critical System.
- 6) Monitoring and preserving of electronic logs of access of Critical Assets.
- 7) Detecting cyber-attacks on SCADA and ICS systems
- 8) The handling of Critical System during cyber crisis.
- 9) Action plans and procedures to recover or re-establish normal functioning of Critical Assets and access thereto following a Cyber Security Incident.
- 10) Hands on SCADA operation at any of the Regional Load Dispatch Centre.
- 11) Handling of risks involved in the procurement of COTS Products.

5.3.34 Management Information System (MIS) for 75 MW (AC) Project:

- a. Web based monitoring shall be machine independent. The web based monitoring shall provide same screen as available in the plant. All reports shall also be downloaded from remote web client in PDF / Excel format.
- b. The Bidder shall provide web based Real Time Remote monitoring system such that the data from 75 MW (AC) project shall be available to remote location(s) for viewing data by GIPCL officials at GIPCL Offices in existing PCs and also outside the offices and to other Government agencies through internet/web based link for real time monitoring of complete system.
- c. Complete 75 MW Plant data shall be available to remote locations.
Minimum 4 Nos. of concurrent remote logins/user are envisaged for web based monitoring/view. Remote monitoring data for MIS shall be viewed at existing the Owner's PC / mobile. Separate PC / work station for MIS System is not envisaged. All data shall be accessible through internet with password protected login. Further, facility shall be provided for data view from mobile devices also. User ID and password for remote view can only be changed by SCADA administrator.

5.3.35 Testing Instruments for Electrical & Electronic:

The Contractor shall also provide required set of onsite testing instruments/equipment viz. earth resistance tester, rheostats, insulation tester, millimetres, clamp meters, CRO, Function Generator, Transformer oil BDV kit, Relay testing kit, infra-red thermal imaging hand held temperature meter, inverter testing kit etc.

5.3.36 Electronic LED Display Board:

The Contractor shall provide an electronic LED Display board that can display the Solar PV plant parameters like total generation till date, daily generation, instantaneous generation, instantaneous frequency, etc. The LED display board has to be erected at a height of 8 feet above ground level and should be large enough to be read from a distance. The LED display board is to be placed between the Control Room and the main gate, the exact location of which will be provided by the Owner/ Consultant after award of the project.

| Pixel pitch | 16.0 mm |
|-------------------------|--|
| Brightness | 6,500 nits |
| LED configuration | DIP / Equivalent |
| Pixel density | 3,906/sqm 363/sqft |
| Viewing angle | H: 140 degrees V: -45/+15 degrees |
| Contrast ratio | 2,000:1 |
| Lifetime | 80,000 hrs |
| Power consumption | Typical: 220W/sqm; 20W/sqft Max: 480W/sqm; 45W/sqft |
| Processing | 16 bit/color |
| Refresh rate | 4,800 Hz |
| Operating temperature | -20/+50 degrees Celcius; -4/+122 degrees Fahrenheit |
| IP rating | IP 65/54 |
| Tile size (WxHxD) in mm | 1,024 x 1,024 x 212 mm / 40.3 x 40.3 x 8.3 inches |
| Serviceability | Front or back |
| Certifications | CE, UL/ETL, FCC, CB/CEBEC, TUV GS, CCC, RoHs, WEEE |

5.3.37 CCTV Camera System for 75 MW (AC) Project

The Contractor shall provide IP Based CCTV Camera for the Monitoring of Control Room, Plant Perimeter, Boundary, Entry & Exit Gates complete in all respect including necessary Camera, NVR, Switch, Active & Passive Components, Software, minimum 32" monitor etc.

For the capacity of 3.5 & 5 MW land parcel, minimum 16 Nos. of CCTV Camera of various Indoor / Outdoor with Night Vision Camera to install at each plot.



i. Camera Specification (Outdoor):

1/3" CMOS HD sensor, Out Door Bullet H.264 Compression, 2 mega Pixels CMOS, 3DNR, The highest resolution can be up to 1920×1080 Low Lux, DWDR, Support Voice talk, 1CH Audio in/1CH Audio Out, Mobile P2P Viewing, Support Protocol: TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, DNS, ARP, ICMP, POP3, NTP and RTSP, Support ONVIF 2.0, Lens : 2.8-12mm Megapixel lens (4-9mm lens optional), IR Distance: 20-30m, POE (802.3af). Support ROI function, Built-in Micro SD/SDHC/SDXC card slot, Ingress Protection level: IP66, Video Bit Rate 32 Kbps – 8 Mbps, Audio Compression G.711/G.722.1/G.726/MP2L2, Dual Stream, BLC, ROI STANDARD: ONVIF, PSIA, CGI, ISAPI, Operating Conditions -30 °C – 60 °C (-22 °F – 140 °F).

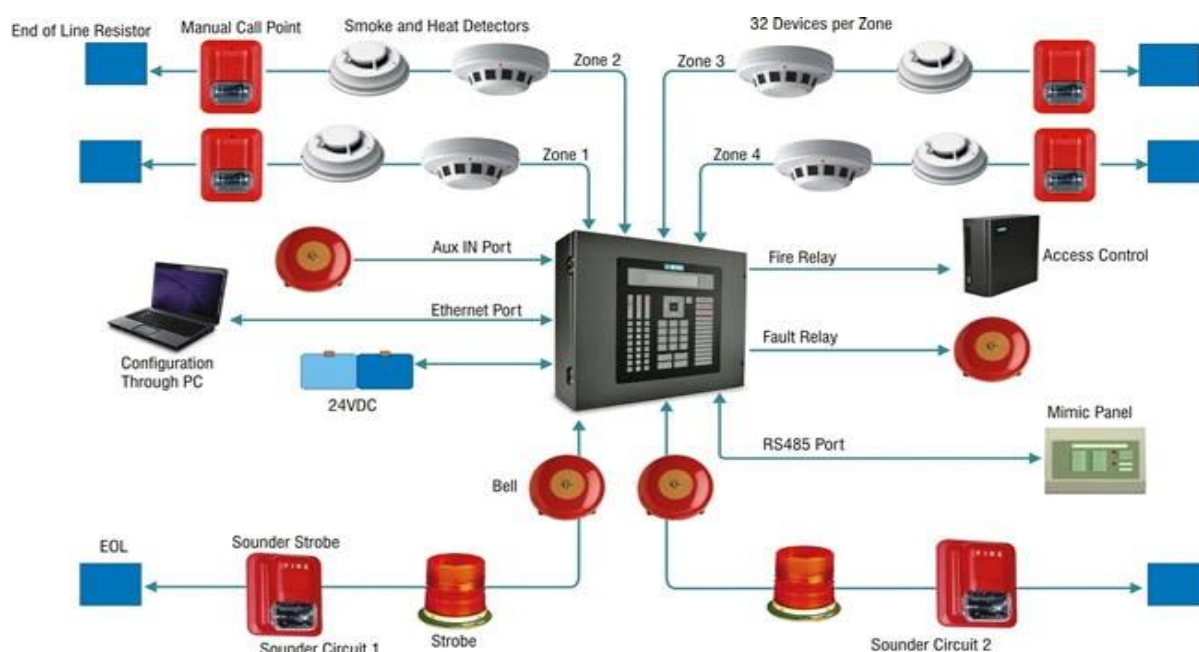
ii. Camera Specification (Indoor):

1/3" CMOS HD sensor, Indoor Dome fix Lens H.264 Compression, 1.3 mega Pixels CMOS, 3DNR, The highest resolution can be up to 1280×960 , Shutter Speed: 1/3 s to 1/100,000s, Min. Illumination: 0.01Lux @ (F1.2, AGC ON), 0 Lux with IR 0.028 Lux @ (F2.0, AGC ON), 0 Lux with IR, Video Bit Rate 32 Kbps – 8 Mbps, Support

Protocol: TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, DNS, ARP, ICMP, POP3, NTP and RTSP, Support ONVIF 2.0, Lens : 3.6mm 1.3Mega Pixel Lens SD, 3DNR, D-WDR, Motion Detection, Privacy Mask, 24pcs LED, 20m IR distance, POE(802.3af), Support Dual stream, Impact protection : IK10, operating condition, Support ROI, BLC, Standard : ONVIF, PSIA, CGI, ISAPI, Image Settings: Rotate mode, Saturation, Brightness, Contrast adjustable by client software or web browser, H.264 Type: Baseline Profile / Main Profile.

5.3.38 Fire Alarm System

The contractor shall provide Fire Alarm System for LCT, MCR & Control Room as per local CFO's guideline. The Class A type wiring shall be done so that single point failure will not result in failure of even single detector or loop. Fire panel shall have dry type battery inside panel for back up and have its own battery charger circuit



Fire Alarm Panel : Integrated Fire Detection, Alarm and Control System with Voice Evacuation (EVAC) of UL listed Microprocessor based networkable analogue addressable Main Fire Alarm Control having required loop capacity, each loop having capacity of 159 addressable detectors and 159 addressable devices. Panel capacity can be expanded to additional loops by addition of modules or integrating multiple panels. Panel costs to include power supply, 24VDC power supply automatic battery charger, 24 volts sealed lead acid

batteries sufficient for 24 hours normal working and then be capable of operating the system for 2 hours during emergency conditions. The system should be complete with user-friendly programming and configuration tools, front panel operating with a full QWERTY keypad and alphanumeric 640 character LCD display. The Panel as well as detectors and devices shall be UL 9th edition Approved/Listed and in conformance with international standards such as NFPA 72 2010 edition National Fire Alarm and Signalling Code for Human Life Safety. The complete system as a solution must be supplied from the same make/OEM manufacturer components conforming to these standards. The panel shall have the capability to integrate with SCADA on open protocol.

Smoke Detector: Analog Addressable Multi-Criteria Sensing Type Detector or Heat Detector as per application must be with mounting based LED, Address Switch inclusive of detector base and complete as required. All Detectors must be UL Listed & FM Approved.

Sounder : UL Listed Directional Sounders with 20 hz to 20 khz operating frequency with minimum 8 distinct sound patterns to indicate corridors, Exit doors, Move upward, move down ward etc. to direct Occupants for fast & safe Evacuation as specified in NFPA 72 - 2007 edition complete as per all requirements of technical specifications & contracts works.

Manual Call Point / Glass Break Device: UL listed, Flush or surface mounted Manual Call Point in manufacturers prescribed matching red enamel outlet box complete. All components must be of same manufacturing origin.

Monitor, Control Modules & Fault Isolators: UL listed, modules complete with mounting arrangement on North American junction box as per requirements of contract works.

5.3.39 Vendor List

The list of acceptable makes for equipment / system for 75 MW (AC) Project are as listed below:

| Sr. | Description | Vendor Name |
|-----|----------------|---|
| 1 | PCU / Inverter | SMA |
| | | ABB India Ltd. |
| | | Hitachi Hi-Rel Power Electronics Pvt Ltd. |
| | | Delta |
| | | Schneider |
| | | Sungrow |

| | | |
|---|---|---|
| | | Bidder to propose other reputed make based on reference and credentials for approval of GIPCL |
| 2 | PV Modules | Top 20 from List of Tier-1 manufacturer as per Bloomberg BNEF Q4 2021 report and fulfilling the other tender requirements, subject to approval of Owner (Indian make Vikram, TATA, BHEL, Warree are acceptable OR Indian PV Module Manufacturers having 500 MW per annum capacity and 1000 MW cumulative installation, with single plant of 50MW or more operational since 1 year) |
| 3 | HT Panel /HT Breaker | Siemens L & T ABB Schneider Jyoti CGL |
| 4 | Control and relay panel | ABB Siemens Schneider Alstom |
| 5 | LT Switchgear component (LT switchgear panel shall be CPRI approved vendor) | L & T Siemens ABB Schneider |
| 6 | Power Transformer | Voltamp Schneider CGL ABB BHEL ALSTOM |
| 7 | Inverter Transformer | Schneider Voltamp ABB CGL T & R Danish Pvt Ltd |
| 8 | Auxiliary Transformer (Dry Type) | Voltamp Kotson |



| | | |
|----|--------------------------|-----------------------------|
| | | Danish |
| | | Melcon |
| | | Urja Techniques (I) Pvt Ltd |
| | | Jayesh Electricals Limited |
| 9 | Solar Cable and DC Cable | M/s LAPP |
| | | M/s Siechem |
| | | M/s KEI Cables |
| | | M/s UniFlex Cables |
| | | M/s Cords Cables |
| | | M/s Apar |
| | | M/s Universal |
| | | M/s KEC |
| | | M/s Leoni |
| | | M/s Suyog Electricals Ltd |
| 10 | AC Cable (Up to 33 kV) | M/s LAPP |
| | | M/s KEI Cables |
| | | M/s Havells |
| | | M/s Universal |
| | | M/s KEC |
| | | M/s GEMSCAB Industries Ltd, |
| 10 | HT termination kits | M/s Suyog |
| | | Raychem |
| 11 | Optical Fiber Cable | 3M |
| | | Finolex |
| 12 | Earthing Pit Materials | D-Link |
| | | Ashlok |
| | | Powertrac |
| 13 | SJB | ERICO |
| | | M/s Hensel Electric Pvt Ltd |
| | | M/s Trinity Solar |
| 14 | Lugs | M/s Eaton |
| | | Dowell |
| | | Comet |
| 15 | Cable Glands | 3D |
| | | Comet / 3D |
| 16 | SCADA System | Rockwell |
| | | Siemens |
| | | Schneider |
| | | GE |

| | | |
|----|---|--|
| 17 | Weather Sensors | a. Pyranometer : i) Keep & Zonen ii) Ingenieurbüro Mencke & Tegtmeier GmbH b. Wind Sensor: ADOLF THIES GmbH & Co c. Temperature Measurement: i) Met One Inc ii) Climatronics d. Wind Speed & direction : i) Met One Inc e. Tripod Stand : i) Met One Inc ii) Climatronics For other reputed make – GIPCL in charge engineer's approval is required. |
| 18 | Batteries | Exide |
| 19 | UPS | Hitachi HI-REL Eaton Emerson |
| 20 | Battery Charger | M/s Chhabi Electrical M/s. Caldine M/s. HBL Niap power system Ltd M/s Servilink M/s Chloride |
| 21 | Lightning Arrestor (ESE type) | Erico Nimbus AT, Spain Ingesco Indelec Ashlok |
| 22 | ABT Energy Meter (subject to approval of GETCO /GUVNL) | SEMS EDM |
| 23 | HT Isolator (Upto 66/220 kV Outdoor Type) | Siemens ABB CGL GR Power switchgear |
| 24 | HT CT & PT (Upto 66/220 kV Oil Filled Type) | ABB CGL Pragati Jyoti Mehru |
| 25 | LA (Upto 66/220 kV Outdoor Type) | CGL Oblum Elpro |
| 26 | 33kV Conductor (Subject to approval of GETCO) | M/s. Torrent Ahmedabad, Gujarat M/s. KEI, New Delhi M/s. Polycab, Daman , Gujarat |

| | | |
|----|--|--|
| | | M/s. GEMSCAB Industries Ltd. |
| 27 | 66/220kV Conductor(Subject to approval of GETCO) | As per GETCO approved vendors. |
| 28 | Disc and post insulator | BHEL Birla |
| 29 | GI structure for the switchyard | Sujana Towers Kalpatru Power transmission OR Any other Approved vendors of GETCO |
| 30 | Insulator hardware | 3M IT IPL Approved vendors of GETCO |
| 31 | Clamps and connectors | Klemenn engineering corporation Approved vendors of GETCO |
| 32 | Numerical Relay | Siemens Areva |
| 33 | Switch fuse unit | Siemens L & T |
| 34 | PLCC equipments | ABB |
| 35 | Lighting fixture / system | Philips / CGL/Bajaj/Havells |
| 36 | CSS (Compact Sub-station) | ABB CGL Siemens Alstom Schneider |
| 37 | LED Lighting | CGL Wipro Bajaj Panasonic Philips |
| 38 | MCCB | SIEMENS ABB Schneider L & T |
| 39 | ICOG/RMU (Ring Main Unit) | ABB Schneider Siemens CGL L & T |
| 40 | Raw material of Steel Structure for MMS | TISCO SAIL JINDAL |



| | | |
|----|---------------------------------|---------------------------|
| | | RINL |
| | | ESSAR |
| 41 | Submersible/Sump Pump | Kirlosker |
| | | KSB |
| | | CGL |
| | | CRI |
| | | Jyoti |
| 42 | CCTV Camera & Monitoring System | Sony /Honeywell/Milestone |

NOTES:

- (1) The final make selected out of the recommended makes listed above shall be subject to the Owner's approval during detailed Engineering.
- (2) Wherever the make is not specified for any other items, the contractor shall submit credential for vendors for relevant items / equipments, out of which Owner shall decide acceptance of vendor based on review of credentials. This shall have no price implication. Owner reserves the right to reject the proposed vendor without assigning any reason.
- (3) Bidder may suggest /request for approval of Additional vendor with credentials and details for review and approval of Owner. Owner may consider the request in case proposed additional vendor is reputed and meeting the tender specification requirements. Owner reserves the right to reject the proposed vendor without assigning any reason.

5.3.40 Mandatory Spares List for each Project

| Sr. | Description | Quantity for 75 MW (AC) Solar Project |
|-----|---|---------------------------------------|
| | PV Module | |
| 1 | SPV Module | 0.1% of Total supply. |
| 2 | MC-4 Connector Set (Including Y Connector- if used | 1% of Total Supply Nos. |
| | PCU | |
| 1 | Complete IGBT stacks assembly with drivers for 1 inverter | 2 Set |
| 2 | Surge protection devices for 1 inverter | 4 Sets |
| 3 | Fuse (each type & rating) for 1 inverter | 4 Sets |
| 4 | Fuse Holder (each type & rating) for 1 inverter | 4 Sets |
| 5 | Power supply SMPS set for 1 inverter | 1 Set |



| | | |
|----|--|----------------------------|
| 6 | Control card – each type and rating for 1 inverter | 2 Sets |
| 7 | Tripping and Closing coil of ACB of AC side, for 1 inverter | 3 Sets |
| 8 | Cooling Fan (each Type and rating) for 1 inverter | 2 Sets |
| 9 | DC Breaker | 1 no |
| 10 | AC Breaker | 1 no |
| 11 | AC Contactor | 1 no |
| 12 | Bus Bar each type | 1 set |
| | Any other spares as per recommendation of OEM | |
| | SJB | |
| 1 | Complete String Junction Box with component | 4 Nos. |
| 2 | Surge Protection Devices each type | 20 Nos. |
| 3 | Junction box fuses | 500 Nos. |
| 4 | Electronic Module each type | 4 Nos. |
| 5 | Power Supply Unit | 4 Nos. |
| | INVERTER TRANSFORMER & POWER TRANSFORMER | |
| 1 | Buchholz relay | 1 Set |
| 2 | OTI & WTI complete | 1 Set. |
| 3 | MOG | 1 Set. |
| 4 | Valve (each type) | 1 No. |
| 5 | Silica gel breather | 1 Set. |
| 6 | Bushing & Support insulator (each type) | 1 No. |
| 7 | Pressure relief device | 1 Set. |
| 8 | Remote winding temperature indicator with sensing device and matching unit | 1 No |
| 9 | Cooler Fan with motor | 1 No |
| 10 | Set of Valves | 1 Set |
| 11 | Set of Starter, contactors, relays and switches for Elect. Control panel | 1 Set |
| 12 | Remote Tap position indicator | 1 No |
| 13 | OLTC Surge relay | 1 No |
| 14 | Aircell | 1 No. if applicable |
| 15 | OLTC Diverter Switch & Drive Mechanism Box | 1 Set |
| 16 | Bushings of each type for 245kV/36kV/ Neutral Bushing (36kV) | 1 Set |
| 17 | 72.5 kV bushings | 2 Nos. |
| 18 | Insulating oil | 10% of Qty of largest unit |
| | Auxiliary Transformers | |
| 1 | Bushings | 1 Set |
| 2 | OTI & WTI with sensing device | 1 Set |
| 3 | Tap Changer Contacts | 1 Set |
| 4 | Buchholz really | 1 No |



| | | |
|----|--|---|
| 5 | Silicagel Breather | 1 No. |
| 6 | Pressure Relief Device | 1 No |
| 7 | MOG | 1 No |
| | Structure | |
| 1 | Complete Structure assembly for One Array / String | 2 Set |
| | AC / DC Distribution Boards | |
| 1 | Indicating Lamps of each type used | 04 Nos. |
| 2 | Contactor of each type used | 02 Nos. |
| 3 | Relay of each type used | 01 No. |
| 4 | Indicating instruments of each type used | 01 No. |
| 5 | Circuit Breaker of each type used | 01 No. |
| | Battery Charger | |
| 1 | Indicating instruments of each type used | 02 Nos. |
| 2 | Set of wound Resistor of each type used | 02 sets |
| 3 | Complete Thyristor Bridge/Module of each type used | 04 Nos. |
| 4 | Set of Control/Annunciation Cards of each type used | 1 set for each type of charger |
| 5 | Semi Conducting Type Fast Fuse of each type | 06 Nos. |
| 6 | Auxiliary Fuse of each type used | 05 Nos. |
| 7 | Rectifier Transformer of each type used | 01 No. |
| 8 | Control transformer of each type and rating | 01 No. |
| 9 | Set of relays | 1 Set |
| 10 | Series inductor | 1 No |
| 11 | Set of contactor | 1 set |
| 12 | Filter Capacitors | 1 Set |
| 13 | Set of Switches | 1 Set |
| 14 | Potentiometers | 1 set |
| | Batteries | |
| 9 | Spare Battery cell without electrolyte | 5 Nos for population<100 10 nos for population>100 |
| 10 | Termnal Connectors with hardware | 10 Nos of each type |
| 11 | Float level indicators | 10 Nos |
| 12 | Vent Plugs | 10 Nos |
| | DC Inverter /UPS | |
| 1 | Circuit Breaker of each type used | 02 Nos. |
| 2 | Complete IGBT Module | 02 Nos. |
| 3 | Printed Circuit Cards – Inverter Control Card and Data Logger Card | 02 Nos. |
| 4 | Cooling Fan | 02 Nos. |
| | HT Panel | |
| 1 | Protection relays of each type used | 01 set |
| 2 | Test plugs | 01 No. |

| | | |
|----|--|-----------------------------|
| 3 | Auxiliary relays of each type used | 05 set |
| 4 | Circuit breaker trip and closing coils each type | 02 Nos. |
| 5 | Breaker Position Switch each type and rating | 02 Nos |
| | LT Panel / switchgear | |
| 1 | MCCB | 01 No. |
| 2 | Current transformer each used type | 01 No. |
| 3 | Coils for tripping and closing | 02 Nos |
| 4 | Breaker Position Switch each type and rating | 02 Nos |
| | Control and Relay Panel | |
| 1 | Numerical Relay (IED) of each make and type along with software | 1 No |
| 2 | Auxiliary relays of each type | 1 No |
| | 220/66 kV Switchyard | |
| 1 | Surge arrester for 220/ 66 KV | 2 Nos. |
| 2 | Disc Insulators string 220/66 kV (Each type) | 2 Sets |
| 3 | Conductor of each type used each type | 50 mtr |
| 4 | Stringing hardware | 01 Set |
| 5 | Terminal Connectors on high voltage conductors and equipments each type | 01 Set |
| 6 | Complete drive mechanism including motor for disconnect switches | 01 No. |
| 7 | Trip coils for circuit breakers | 01 No. |
| 8 | Closing coils for circuit breakers | 01 No. |
| 9 | Complete set of rupture disc | 1 Sets |
| 10 | 220/66kV Current transformer of each rating | 02 Nos. |
| 11 | 220/66kV Voltage transformer of each rating | 02 Nos. |
| 12 | 220/66kV Post insulator | 3 Nos. |
| 13 | 220/66kV Isolator contacts set (Male+Female) | 01 Set |
| 14 | Maintenance earthing rod for 220/66 kV | 01 Set |
| 15 | Breaker operating mechanism | 01 Set |
| 16 | SF6 bottle (To fill SF6 in one complete Circuit breaker) | 15% of total Qty used in SS |
| 17 | Contactors and relays of each type and rating used in circuit breaker and isolator control cubicle / Mechanism box | 01 set. |
| 18 | Limit switch for the isolator | 01 Set |
| 19 | 220/66kV Earth switch contact assy. | 01 Set (For three pole) |
| 20 | Density Monitoring device for SF6 Beaker | 01 No |
| 21 | Pressure Switches & Pressure Guages for breakers | 1 Set |
| 22 | Aux Switch Assly for breaker | 1 Set |

| | | |
|----|---|-----------------|
| 23 | Fixed, Moving and arcing concat assemblies including insulating nozzles etc, for 1 interrupter of breaker | 2 Nos. |
| | SCADA System | |
| 1 | Each type of electronic modules including CPU | 1 No. each type |
| 2 | Any type of converter like RS 485 to Ethernet, Serial link converter, MODBUS converter etc | 1 No. each type |
| 3 | Network Switch | 1 No each type |
| 4 | Firewall | 1 No |
| 5 | Gateway | 1 No |
| 6 | Optical Cable Infrastructure | 2 sets |
| 7 | Armoured CAT 6 Cable | 500M |
| 8 | Signal Cable | 500M |
| 9 | Relay Board | 2 Nos. |
| 10 | Any other recommended spares by OEM List shall be submitted for GIPCL approval | |

Notes:

- (1) The suggested spares are the minimum requirement of GIPCL. The EPC Contractor shall ensure sufficient spares beyond the suggested spares list to maintain its contractual obligations.
- (2) Bidder shall furnish recommended spare list as a part of design/drawing approval stage.
- (3) Wherever % indicated in Mandatory spares list, Total installed quantity of each type shall be considered for calculation of % of spare of each type.
- (4) For rounding of upper side number shall be considered for quantity of item.
- (5) All the mandatory spares may be kept at site with record of use by Contractor during O&M. Used items shall be replenished by Contractor time to time. All mandatory spares items shall be handed over to GIPCL after completion of O&M period.
- (6) Above mentioned list is indicative. Spares for transmission lines and switchyard shall be supplied as per CEA "GUIDELINES FOR AVAILABILITY OF SPARES AND INVENTORIES FOR POWER TRANSMISSION SYSTEM (TRANSMISSION LINES & SUBSTATION/SWITCHYARD) ASSETS" – July 2020

--- End of Section---

6. General Terms and Conditions

6.1 Use of Contract Documents & Information

- 6.1.1 The Contractor shall not, without GIPCL's prior written consent, disclose the Contract or any provision thereof or any specification, plan, drawing, pattern therewith to any person other than person employed by the Contractor in performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend strictly for purpose of performance only.
- 6.1.2 The Contractor shall not, without GIPCL's prior written consent, make use of any document or information except for purpose of performing the Contract.
- 6.1.3 Any document other than the Contract itself shall remain the property of GIPCL.

6.2 Patent Rights

- 6.2.1 The Contractor shall indemnify GIPCL against third party claims of infringement of patent, trademark or industrial design rights arising from use of goods/design or any part thereof.

6.3 Materials and Workmanship

- 6.3.1 All materials shall be of the best quality and workmanship capable of satisfactory operation under the operating and climatic conditions as may be specified. Unless otherwise specified, they shall conform in all respect to the latest edition of the relevant Bureau of Indian Standard (BIS) specification wherever Indian specifications apply or British Standard (BS) or International Electro-technical Commission (IEC) or internationally accepted standard.
- 6.3.2 The Contractor shall supply and deliver all equipment and materials for installation at site. The Contractor shall arrange for transportation, loading and unloading and safe storage of materials at project site at his own cost and risk.
- 6.3.3 If the Contractor offers equipment manufactured in accordance with other international well recognized standards, he shall, in that case, supply a copy in English of the Standard Specification adopted and shall clearly mention in what respect such standard specification differs from Indian Standard Specifications. The plant, equipment, and materials offered by the Contractor should comply with one consistent set of Standards only as far as possible.

6.3.4 No deviation in foreign exchange rate shall be admissible at any point of time after submission of the Bid.

6.4 Inter-changeability

6.4.1 All the parts shall be made accurately to standard gauges and specifications so as to facilitate replacement and repairs. All corresponding parts of similar apparatus shall be inter-changeable.

6.5 Packing and Marking

6.5.1 The Contractor shall be responsible for securely protecting and packing the plant and equipment as per prescribed standards in force to withstand the journey and ensuring safety of materials and also arrival of materials at destination in original condition and good for contemplated use. Packing case size and weight shall take into consideration the remoteness of the goods' final destination and absence of heavy material handling facilities at all points in transit.

6.5.2 Packing lists of materials shall be provided in each package to facilitate checking up of the contents at the destination.

6.5.3 In order to import any items, associated with the Project, from abroad or from any other state in India, the Contractor shall have to arrange any clearance, permission, if required at his own risk, from any Government (Government of State and Government of India) or any Government (Government of State and Government of India) controlled organization for transportation of materials from manufacturing shop to delivery at any site. Necessary certificates if so required shall be issued by GIPCL within reasonable time after getting written request from the Bidder along with the necessary documents substantiating necessity of such approvals. All packing material is the property of GIPCL and shall be immediately deposited by the Contractor to GIPCL's Store at Project Site.

6.6 Negligence

6.6.1 If the Contractor neglects to manufacture or supply the plant and equipment with due diligence and with expeditiousness or refuses or neglects to comply with any reasonable order given to it in writing by GIPCL or contravenes any provisions of the Contract, GIPCL may give seven (7) seven days notice in writing to the Contractor, to make good the failure, neglect or contravention complained of. If the Contractor fails to comply with the notice within reasonable time from the date of serving thereof, in the event of failure,

neglect or contravention capable of being made good within that time, then in such case, if GIPCL thinks fit, it shall be lawful for it to take the manufacture or supply of plant wholly or in part, out of the Contractor's hand and give it to another person on Contract at a reasonable price and GIPCL shall be entitled to retain any balance which may be otherwise due on the Contract by it to the Contractor or such part thereof as may be necessary, to the payment of the cost of manufacture or supply of such plant as aforesaid.

6.6.2 If the cost of executing the work as aforesaid shall exceed the balance due to the Contractor and the Contractor fails to make good such deficiency, GIPCL shall take action in the manner it may consider deem fit in terms of the Contract.

6.7 Statutory Responsibility

6.7.1 The Contractor shall comply with all applicable laws, by laws, rules, and regulations and shall procure and maintain their validity all necessary Municipal, Panchayat and Government permits & licenses etc. at its own cost.

6.7.2 Compliance of Scheduling and forecasting shall be carried by the successful EPC contractor as per GERC Notification No.1 of 2019 (FORECASTING, SCHEDULING, DEVIATION SETTLEMENT AND RELATED MATTERS OF SOLAR AND WIND GENERATION SOURCES) REGULATIONS, 2019 and any changes from time to time. Further all the cost for hiring QCA (Qualified Coordinating Agency) for forecasting and scheduling shall be in scope of the Successful EPC contractor.

6.7.3 Penalty due to mismatch in scheduling and forecasting shall be equally shared by GIPCL and the successful EPC Contractor.

6.8 Insolvency and Breach of Contract

6.8.1 GIPCL may at any time by notice in writing summarily terminate the Contract without compensation to the Contractor in any of the following events:

- If the Contractor at any time, is adjudged insolvent or have a receiving order or order from administration of its state made against it or shall take any proceeding for compensation under any Insolvency Act for the time being in force or make any conveyance or assignment with its creditors or suspend payment. If the Contractor being a company is wound up voluntarily or by the order of a court or a Receiver, Liquidator or manager on behalf of the Debenture holder is appointed or

circumstances have arisen which entitle the Court or debenture holder to appoint a Receiver, Liquidator or Manager.

6.9 Timeline (Best Effort Schedule)

6.9.1 The Contractor shall provide full programme of the supply in detail and delivery schedule along with work schedule thereto. Strict adherence and guaranteed delivery schedule mentioned in terms and conditions shall be the essence of the Contract and delivery schedule must be maintained.

6.9.2 The work must be completed as per the Timeline below from the date of handing over of site.

Best Effort Schedule

| Sr. | Stage | Reference from Zero Date (“D”) |
|-----|--|--------------------------------|
| 1. | Issue of Letter of Intent | D |
| 2. | Completion of site developmental work | D+50 |
| 3. | Commencement of civil work | D+70 |
| 4. | Approval of major drawings | D+100 |
| 5. | Completion of supply of major balance of system | D+180 |
| 6. | Completion of Civil work & erection of MMS in phased manner, as per agreed schedule | D+215 |
| 7. | Completion of supply of PV modules, in phased manner, as per agreed schedule | D+285 |
| 8. | Completion of Civil work for Inverter room and Control room, General Civil works, in phased manner, as per agreed schedule | D+325 |
| 9. | Installation and interconnection of all DC circuit | D+360 |
| 10. | Installation and interconnection of all AC circuit | D+380 |
| 11. | Interconnection and testing of entire plant | D+410 |
| 12. | Commissioning of entire plant | D+430 |
| 13. | COD with GUVNL/GEDA (full capacity) | D+455 |
| 14. | Operational Acceptance Test & Completion of Facilities (Tentative) | D+485 |
| 15. | Plant Stabilisation and Operation by EPC Contractor and earn incentive for early commissioning | D+455 to D + 519 |
| 16. | Performance Guarantee Test-cum-Final Acceptance Test (Tentative) after completion of first year of operation after COD with GEDA/GUVNL | D+820 |



- 6.9.3 The Contractor shall also provide a Bar/ PERT Chart indicating completion schedule for various items involved in the work within the stipulated completion period and the Contractor should strictly adhere to that schedule.
- 6.9.4 The issue of LoI shall be considered as the Zero Date.
- 6.9.5 The Bar/ PERT Chart provided by the Contractor shall submitted to GIPCL for approval prior to commencement of the execution of the Project. All comments and modifications provided by GIPCL shall be incorporated and adhered to by the Contractor in the Timeline, Bar/ PERT Chart, detailed execution plan, etc. for execution of the Project.
- 6.9.6 Based on above timeline, Bidder/Contractor to submit detailed schedule/timeline for each Inverter Block.
- 6.9.7 The Commissioning of the Project shall be carried out based on GUVNL RFS referred in this tender, inline with commissioning procedure of GUVNL. GEDA/GUVNL authorized representative will witness and validate the commissioning procedure at site. Commissioning certificate shall be issued by State Nodal Agency or GUVNL after successful commissioning.
- 6.9.8 “Commissioning” word indicated in this tender shall mean commissioning certificate issued by State Nodal Agency (GEDA) or GUVNL after successful commissioning.
- 6.9.9 Partial commissioning in 75 MW (AC) Solar Project shall be allowed in the minimum 25 MW and as per GUVNL’s RfS. Also partial commissioning shall be considered by GIPCL subject to consideration and acceptance by GEDA/GUVNL. In case of part commissioning of the project, within 30 days contractor shall complete all pending jobs including but not limited to PV module cleaning etc. After 30 days of part commissioning regular O&M phase shall start for that capacity including obligation for NEEGG as per Tender.

6.10 Delay in Execution or Failure to Supply

- 6.10.1 Any delay in completion of the work shall attract liquidated damage/ penalty for late completion as per Liquidated Damage (Clause 6.11) of this Tender.

6.10.2 If the Contractor fails to deliver the plant or fails to start the work within specified time frame after issue of LoI or fails to carry out the work as per agreed schedule or leaves the work site after partial execution of the work, GIPCL shall have the right to get the work done through any other agency at the risk and cost of the Contractor. Further to this, GIPCL may, without prejudice to the right of the Contractor to recover damages for breach of trust of the Contract, may impose penalties.

6.10.3 Notwithstanding anything contained in this tender document, bidders to note that Completion time of Project activities as per the prescribed timeline/schedule is the essence of the Contract. It is envisaged that EPC Contractor shall plan and achieve progress of the Project on or before the prescribed timeline/schedule without fail.

6.10.4 If, at any time, the CONTRACTOR's actual progress falls behind or is likely to fall behind the agreed schedule of the break-up/detailed Project activities, the CONTRACTOR shall submit to the OWNER, a revised programme with catch up schedule, taking into account the prevailing circumstances and delay in the respective activities / milestones. The CONTRACTOR shall, at the same time/forthwith notify promptly to GIPCL of the steps being taken to expedite progress of the Project activities, so as to achieve completion of such activities within the agreed Time schedule for Completion. The Contractor shall in order to overcome the situation, forthwith mobilise required additional resources like manpower, materials, machineries etc. to achieve the prescribed timeline/schedule at his risk and cost.

6.10.5 In case further slippage is observed in the progress of Project activities, as per agreed time schedule or failure by EPC Contractor, at any stage of the Contract, to perform the Contract diligently to fulfil his obligations as per the EPC Contract, GIPCL reserves the right to engage any other Contractor(s)/sub-contractor(s) at any time, at the risk and cost of the EPC Contractor to ensure completion of the Project activities in line with the agreed time schedule. Further, GIPCL will also deduct Liquidated Damages (LD) arising out of any such delay, if any, as per the terms of this tender document or recover the costs, expenses, losses, damages incurred or suffered by GIPCL as per the recourse available under this tender document or any other law for the time being in force.

6.11 Liquidated Damages for Delay and Underperformance

A. Delay in Commissioning and COD with GEDA/ GUVNL

6.11.1 In case the EPC Contractor fails to achieve successful Commissioning/ COD of 75 MW (AC) with GUVNL within 16 months (i.e. 485 Days) from the date of LoI (Zero date), then GIPCL shall levy the Liquidated Damages on the EPC Contractor. Partial commissioning in 75 MW (AC) slot shall be allowed in the minimum 25 MW (AC) and preferably maximum in three slots. However, Operational Acceptance Test (OAT) shall start only when respective 75MW (AC) capacity commissioned by the Contractor.

6.11.2 Completion time is the essence of the Contract and the same shall be firm and binding. The Bidder shall complete “COD with GEDA/GUVNL” of 75 MW (AC) Solar PV Projects within 15 months (455 Days) on best effort basis. For calculation of Liquidated Damages (LD), Project schedule shall be considered as 485 Days i.e. project shall be completed (COD with GEDA/GUVNL, with full capacity) within 485 Days from the “Zero Date (i.e. Date of LoI)”.

6.11.3 In case the EPC Works of solar PV project (COD with GEDA/GUVNL, with full capacity) is not completed within the stipulated time period (i.e. 485 days from zero date) and the delay is not due to Force Majeure or due to GIPCL’s default then the Contractor shall pay to the GIPCL compensation for delay subject to following:

6.11.4 Delay up to 30 days: Amount of Rs. 15,000/MW/Day shall be deducted as penalty for the first 30 days of delay, calculated on per day basis and proportionate to the capacity not commissioned as COD with GEDA/GUVNL.

6.11.5 Delay of more than 30 days and up to 60 days: Amount of Rs. 25,000 /MW/day shall be deducted on per day basis and proportionate to the capacity not commissioned as COD with GEDA/GUVNL.

6.11.6 Delay of more than 60 days: Amount of Rs. 35,000 /MW/day shall be deducted on per day basis and proportionate to the capacity not commissioned as COD with GEDA/GUVNL.

Maximum applicable Liquidated Damages: The upper ceiling for total liquidated damages for delay shall be maximum 10% of the EPC Contract Price.

6.11.7 The said right of the GIPCL to levy damages on account of delay shall be without prejudice to and in addition to the right of the Company to get the concerned work done from a third party at the complete risk and cost of the Contractor.

6.11.8 The Contractor shall indicate duration of all the activities in activity chart in conformity with the overall schedule of the completion of project. The Contractor shall submit the activity chart in form of Bar Chart which shall be discussed and finalized and shall be a part of Contract.

6.11.9 Any strike / lockouts at works or site of the Contractor or his sub-supplier/sub-contractor shall not be considered as force majeure condition.

6.11.10 For calculation of penalty, date of issue of LOI shall be the reference date.

B. Underperformance

6.11.11 At the time of the Operational Acceptance Test, any shortfall in the Performance Ratio (PR) as determined through the Test Procedure in the Appendix 16: Procedure for Performance Testing will attract imposition of Liquidated Damages after one (1) unsuccessful chance. For any shortfall in PR below 0.75 by the Bidder for the second (2) time, a penalty of 1% of the EPC Contract Price (including taxes & duties) shall be levied. In case the first the Test is unsuccessful then penalty shall not be charged but the Contractor has to make the necessary corrections to conduct the test again within the stipulated maximum 30 days, so as to demonstrate the PR equal to or more than 0.75. In the second (2nd) time, a penalty at the rate specified above shall be levied on the Contractor. The penalty shall be deducted from the pending payment and Performance Bank Guarantee. However, if Contractor feels that NEEGG may not be achieved and want to carry out further correction, the same will be allowed for the one more time i.e. 3rd time but PG Test and O&M period shall start from such later date as mentioned in Point no. A (xi) in NIT; Table Pg. 5. In case the Contractor is successful in 3rd attempt then 1% of the EPC Contract Price (including taxes & duties) deducted after unsuccessful 2nd attempt shall be returned. However, if the Contractor fails in the 3rd attempt as well then the penalty deducted at the time of 2nd unsuccessful attempt shall not be returned.

C. Performance Guarantee Test / Final Acceptance Test

6.11.12 If the “Actual Delivered Energy” at metering point (GETCO end sub-station) is less than the Base NEEGG (corresponding to NEEGG quoted for 1st year of O&M) based on the procedure mentioned in the Appendix 15, then the penalty at rate of Rs (2.75x 1.0) per kWh shall be charged for the shortfall. The Bidder / Contractor shall make necessary

correction to meet quoted NEEGG. In case contractor fails to pay penalty as above within 30 days, then the entire Performance Bank Guarantee shall be encashed by the Owner and all the remaining payments yet to be made by the Owner to the Contractor shall also be forfeited.

6.12 Penalty / Incentive for Generation during Operation & Maintenance (O&M)

A. Penalty for loss of Generation during O & M

6.12.1 For each Contract Year, the Contractor shall demonstrate “Actual Delivered Energy” at the Metering Point (GETCO end sub-station) as compared to the ‘Base NEEGG’ for the particular year (calculated as per the methodology given in Appendix 16 Part C).

6.12.2 If for any Contract Year, it is found that the “Actual Delivered Energy” is less than ‘Base NEEGG’ for the particular year, the Contractor shall pay the compensation to GIPCL equivalent to Rs. (2.75 x 1.0) per kWh of under-generation. The same shall be recovered from payment yet to be made by GIPCL to the Contractor and/ or from the Bank Guarantees available with GIPCL. (Up to 105% of Base GHI). As Example if annual GHI is 1840Kwh/m² is base GHI and Quoated NEEGG is 17,73,90,000 kwh and actual annual GHI is 1934kwh/m² (more than 105% of base GHI) and Contractor has achieved corresponding corrected generation up to 1932kWh/m² GHI i.e. 18,62,59,500 kWh then penalty is not applicable.

6.12.3 In case of any defect in the system after Commissioning, the Contractor shall repair it within forty eight (48) hours. After 48 hours, penalty shall be charged and the same shall be deducted / recovered from payments yet to be made by GIPCL to the Contractor and / or from the Bank Guarantee submitted to GIPCL. A penalty at the rate of Rs. (2.75 x 1.0) per kWh shall be charged by the Owner for the loss of generation due to that effect post 48 hours. The loss of generation shall be calculated with respect to the NEEGG of that particular year based on the actual radiation.

6.12.4 However, in case the Contractor fulfils the NEEGG at the end of the year then the amount deducted as a penalty for loss of generation as per this Clause shall be adjusted in the Contractor’s bill or reimbursed. In case the Contractor fails to meet the NEEGG at the end of the year then above-mentioned penalty shall be adjusted from the penalty calculated at the end of the year for the shortfall in the generation so that there is no duplication of

penalty for the same loss of generation. The first 48 hours shall not be considered for the penalty in case of any defect.

6.12.5 In case the Project fails to generate any power continuously for 6 months any time during the O&M period, it shall be considered as an “Event of Default”.

6.12.6 Upon occurrence of any Event of Default mentioned in Clause 6.12.4 herein above, GIPCL shall have the right to encash the entire amount of O&M Bank Guarantee/ Performance Bank Guarantee submitted by the Contractor and withheld any other pending payment.

6.12.7 The Owner reserves the right to perform random audits of 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 GIPCL from secondary sources and the weather monitoring system installed by the Contractor at the site will be factored in calculating the adjusted NEEGG during the entire year. However, GIPCL will have the final authority to decide on this matter.

B. Incentive for Early Completion & Higher Generation during O & M

6.12.8 Incentive for Early Completion (COD with GEDA/GUVNL): Twenty (20) paisa per unit incentive shall be payable for successfully early completion of the Project subject to early acceptance of COD by GUVNL and receipt of payment to GIPCL

Incentive for higher Generation during O & M: To encourage efficient Operation and Maintenance of the Solar Plant Incentive as per following shall be considered by GIPCL. If for any Contract Year, it is found that the “Actual Delivered Energy” is higher than ‘Corrected NEEGG’ for the particular year, the Owner shall pay incentive to EPC Contractor equivalent to forty (40) Paisa per kWh of excess actual generation during the year. If for any Contract Year, it is found that the “Actual Delivered Energy” is higher than ‘Corrected NEEGG’ for the particular year, the Owner shall pay incentive to EPC Contractor equivalent to Forty (40) Paisa per kWh of excess actual generation during the year. (Up to 105% of Base GHI). Like if annual GHI is 1840Kwh/m² is base GHI and actual annual GHI is 1932kwh/m² and bidder has achieved corresponding corrected generation for GHI of 1932kwh/m² then there is no incentive payable after additional generation beyond 1932kWh/m² of GHI.



6.13 Defect Liability

- 6.13.1 The Contractor must warrant that the facilities or any part thereof shall be free from defects in the design, engineering, materials and workmanship of the Plant and Equipment supplied and of the work executed.
- 6.13.2 If it shall appear to the authorized representative of the Company 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 Contract are unsound or otherwise not in accordance with the Contract, the Contractor shall on demand in writing inform the authorized representative of the Company specifying the item, materials or articles complained of, notwithstanding that the same may have been inadvertently or otherwise 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 authorized representative of the Company in its demand aforesaid, the Project Manager may on expiry of notice period rectify or remove and re-execute the time or remove and replace with others, the materials or articles complained of as the case may be at the risk and cost in all respects of the Contractor. The decisions of the authorized representative of the Company as to any question arising under this Clause shall be final and conclusive.
- 6.13.3 If during the Defect Liability Period any defect 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 GIPCL 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.
- 6.13.4 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:



- a. Improper operation or maintenance of the Facilities by the Contractor during operation and maintenance of the Facility; or
- b. Operation of the Facilities violating specifications of the Facilities.

6.13.5 GIPCL shall give the Contractor a notice stating the nature of any such defect together with all available evidence thereof, promptly following the discovery thereof. GIPCL shall afford all reasonable opportunity for the Contractor to inspect any such defect.

6.13.6 GIPCL shall provide the Contractor all necessary access to the Facilities and the Site to enable the Contractor to perform its obligations.

6.13.7 The Contractor may, with the consent of the Company, remove from the Site any Plant and Equipment or any part of the Facilities that are defective, 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.

6.13.8 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 Company 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.

6.13.9 If such part fails the tests, the Contractor shall carry out further repair, replacement or making good (as the case may be) until that part of the Facilities passes such tests. The tests, in character, shall in any case be not inferior to what has already been agreed upon by GIPCL and the Contractor for the original equipment/part of the Facilities.

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

6.13.11 If the Facilities or any part thereof cannot be used by reason of such defect and/ or making good of such defect, the Defect Liability Period of the Facilities or such part, as the case may be, shall be extended by a period equal to the period during which the Facilities or such part cannot be used by the Company 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 eighteen (18) months from such replacement.

6.13.12 In addition, the Contractor shall also provide an extended warranty for any such component of the Facilities and for the period of time. Such obligation shall be in addition to the Defect Liability Period specified under Clause 6.13.

6.14 Termination for Default

6.14.1 The Owner may, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Contractor, terminate the Contract in whole or in part if the Contractor fails to deliver or execute any or all of the goods within the time period(s) under the Contract or any extension thereof granted by GIPCL pursuant to the clause for Delay in Execution or Failure to Supply or, If the Contractor fails to perform any other obligations(s) under the Contract.

6.14.2 In the event the Owner terminates the Contract in whole or in part, pursuant to above, the Owner may procure, upon such terms and in such manner as it deems appropriate, goods similar to those undelivered, the Contractor shall be liable to the Owner for any excess costs for such similar goods. However, the Contractor shall continue the performance of the Contract to the extent not terminated.

6.14.3 In case the Contractor is not able to demonstrate the “Actual Delivered Energy” as per the “Base NEEGG” based on the procedure mentioned in Appendix 16 during the Performance Guarantee Test and after the penalties levied as mentioned in Clause 6.12; GIPCL reserves the right to terminate the Contract at its discretion if there are no efforts are made from the Contractor to correct the issues regarding plant performance.

6.14.4 In case termination of the Contract due to default, the Contractor may be blacklisted by GIPCL, GUVNL, GERMI and its associate companies, etc. for future work.

6.15 Breach and Cancellation of the Contract

6.15.1 In case of non-performance in any form or change of the covenant and conditions of the Contract by the Contractor, the Owner shall have the power to annul, rescind, cancel or terminate the order and upon its notifying in writing to the Contractor that it has so done, this Contract shall absolutely determine. The decision of the Owner in this regard shall be final and binding.

6.15.2 The Owner may cancel the order or a portion thereof, and if so purchase or authorize purchase of the plant/equipment not so delivered or order Plant/ Equipment of similar description (opinion of the Owner shall be final) at the risk and cost of the Contractor.

6.16 Force Majeure

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

6.16.2 The term “Force Majeure” shall have herein mean riots (other than among the Contractor’s employee), Civil commotion, War (whether declared or not), invasion, act of foreign enemies hostilities, civil war, rebellion, revolution, insurrection, military coup, damage from aircraft, nuclear fission, embargoes, quarantines, acts of god such as earthquake (above 7.0 magnitude on Richter scales), lightning, unprecedented floods, fires not caused by the Contractors negligence and other causes which the Contractor has no control and accepted as such by GIPCL whose decision shall be final and binding. Normal rainy season and monsoons are not Force Majeure.

6.16.3 Upon occurrence of such causes and upon its termination, the party alleging that it has been rendered unable as aforesaid, thereby, shall notify the other party in writing by registered notice within 24 (twenty four) hours of the alleged beginning and ending thereof giving full particulars and satisfactory evidence in support of its claim.

6.16.4 Time for performance of the relative obligation suspended by the Force Majeure shall stand extended by the period for which such clause lasts.

6.16.5 If works are suspended by Force Majeure conditions lasting for more than two (2) months, GIPCL shall have the option of cancelling this Contract in whole or part thereof, at its discretion.

6.16.6 The Contractor shall not claim any compensation for Force Majeure conditions and shall take appropriate steps to insure men and materials utilized by it under the Contract well in advance.

6.17 Progress Report of Work

6.17.1 The Contractor shall submit a weekly progress report on execution of works conforming to bar/ PERT Chart and format provided by GIPCL. In case of any slippage(s) or delay in execution of work reasons for such delay along with details of hindrances will be submitted by the Contractor along with modified Bar/ PERT Chart mentioning the action plan being taken to keep the due date of completion of project unchanged. If required, the Contractor shall use additional manpower to keep the due date of completion of Project unchanged.

6.17.2 The authorized representative of the Contractor shall review the progress of the Project work every fortnight on a prefixed day at project site with GIPCL or its representative as per the network and record the minutes.

6.18 Insurance

6.18.1 During the project period, i.e. before the Commissioning of the Project, all insurance shall be taken by the contractor and related expenses shall be borne by the Contractor. The goods supplied under the Contract shall be fully insured against the loss or damage incidental to manufacture or acquisition, transportation, storage, delivery, theft, natural or other disaster, etc. in such a manner that the Owner shall not incur any financial loss, as long as the construction of the Project continues to remain under the custody of the Contractor.

6.18.2 In case of any loss or damage or pilferage or theft or fire accident or combination of the said incidents etc. under the coverage of insurance, the Contractor shall lodge the claim as per rules of insurance. Any FIR required to be lodged to local Police Station shall be the responsibility of the Contractor.

6.18.3 The Contractor shall arrange to supply/ rectify/ recover the materials even if the claim is unsettled for timely completion of the Project. The final financial settlement with the insurance company shall be rested upon the Contractor.

6.18.4 In case of any delay of the Project attributable to the Contractor, the Contractor himself in consultation with the Company should take the extension of insurance. Any financial implications shall, however, be borne by the Contractor.

6.18.5 The Contractor shall arrange for providing insurance coverage to its workmen under Workmen's Compensation Act or similar Rules and Acts as applicable during execution of work for covering risk against any mishap to its workmen. The Contractor shall also undertake a Third Party Insurance. The Owner shall not be responsible for any such loss or mishap.

6.18.6 Comprehensive insurance is to be arranged by the Contractor during the O&M period of the Contract.

6.18.7 At the end of the term of insurance undertaken by the Contractor, the Contractor shall provide all the necessary documents to the satisfaction of the Company in order to enable the Company to take up the insurance of the Plant.

6.19 Statutory Acts, Rules and Standards

6.19.1 The work shall be executed in conformity with the relevant standard of Bureau of Indian Specification (or equivalent International Standard), Electricity Rules, 2010 (as amended up to date), Indian Electricity Act, BARC/DAE rules, Explosive Act 1948, Petroleum Act 1934, National Building Code and relevant Rules in vogue at the time of execution including operation and maintenance period.

6.20 Tools and Tackles

6.20.1 The Contractor shall provide technically suitable tools and tackles for installation & erection of Plant and Machineries conforming to relevant BIS safety and technical standards for proper execution of work. The Owner, in no way, shall be responsible for supply of any tools and tackles for implementation of the work and also to carry out operation and maintenance activities.

6.21 Safety Measures

6.21.1 The Contractor shall have to provide necessary and adequate safety measures including personal protective equipment and precautions to avoid any accident, which may cause damage to any equipment/ material or injury to workmen. The Owner shall not be responsible for any such accidents.

6.22 Hazardous Material

6.22.1 Any hazardous material used during construction or used as part of the plant has to be taken back by the supplier for recycling or dumping purpose after its operating/ working life, so that it may not affect the environment or any living being. The Contractor shall comply with the State Pollution Board regulation.

6.23 Stoppage of Work

6.23.1 The Owner shall not be responsible and not liable to pay any compensation due to stoppage of work as a reaction from local public due to any undue action on the part of the Contractor causing annoyance to local people.

6.24 Hindrance Register

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

6.25 Responsibility of the Contractor

6.25.1 The Contractor shall provide guarantee and be entirely responsible for the execution of the Contract in accordance with this tender including but not limited to its specification, schedules, and annexure. The Contractor shall further provide guarantee and be responsible for the quality and workmanship of all materials and completed works, correct designs and drawings, correct delivery of material, erection, testing and commissioning including operation and maintenance.

6.26 Right of the Owner to Make Change(s) in Design

6.26.1 All designs shall be approved by GIPCL prior to the execution of such designs.

6.26.2 The Owner shall have the right to make any change in the design, which may be necessary in the opinion of GIPCL to make the plant and materials conform to the provisions and contents of the specification without extra cost to GIPCL.

6.27 Manuals

6.27.1 The Contractor shall supply all necessary erection and commissioning manuals, O&M manuals etc. as and when required. Six sets of test results, manuals etc. shall be submitted by the Contractor on completion of the work in hard and soft copies.

6.28 Governing Language

6.28.1 The Contract shall be written in English Language. All correspondence and documents pertaining to the Contract, which are exchanged by the Owner and Contractor, shall be written in English.

6.29 Order Amendments

6.29.1 No variation in or modification of the terms of the contract shall be made except by written amendments issued by the Owner.

6.30 Assignments or Subletting of Contract

6.30.1 The Contractor shall not, without the prior consent in writing of the Owner, assign or sublet or transfer its Contract in whole or in part, its obligations to perform under the Contract or a substantial part thereof, other than raw materials, or for any part of the work of which makers are named in the Contract, provided that any such consent shall not relieve the Contractor from any obligation, duty or responsibility under the Contract.

6.31 Subcontracts

6.31.1 The Contractor shall notify the Owner in writing of all subcontracts awarded under the Contract if not already specified in his Bid. Such notification in its original Bid or later shall not relieve the Contractor from any liability or obligation under the Contract.

6.31.2 Subcontracting a work shall not, under any circumstances, relieve the Contractor from its obligations towards the Project and the Owner.

6.31.3 In case, the Contractor engages any Subcontractor to carry out a part of the work, the Subcontractor should have requisite Government License for carrying out such part of the work.

6.32 Inspection and Testing

6.32.1 The Owner or its authorized representative including appointed Consultant for the project shall have, at all times, access to the Contractor's premises and also shall have the power to inspect and examine the materials and workmanship of project work during its manufacture, shop assembly and testing. If part of the plant is required to be manufactured in the premises other than the Contractor's, the necessary permission for inspection shall be obtained by the Contractor on behalf of GIPCL or its duly authorized representative.

6.32.2 The Contractor shall offer following Test / Inspection to the Owner.

- (i) GIPCL may depute its Engineer or representative or hire an agency for Third-Party Inspection, for pre-dispatch inspection at the manufacturing facility of the Contractor all items under this RFP as per applicable standards, approved QAP and documents. Samples for testing shall be drawn randomly in presence of GIPCL/ inspecting agency from the lot offered for inspection. After Test/Inspection of the Items at factory, the Contractor is to submit the inspection & test reports to GIPCL for review. After review of the inspection & test reports, GIPCL will give dispatch clearance in writing. The Contractor shall not dispatch any item without dispatch clearance from GIPCL, in writing.
- (ii) GIPCL may depute its Engineer or representative or third party inspection agency for inspection during manufacture and in assembled condition prior to dispatch in accordance with the standard practice/ QAP of the manufacturer and applicable Standards, at no additional cost to GIPCL for demonstration and performing the test/inspection. The Contractor shall raise inspection call with internal test reports in advance for all items like PV Modules, MMS, cables, SJBs, Inverters, Transformers, HT & LT switchgears, DC system, Switchyard equipments, earthing system, SCADA, RMU etc.
- (iii) Upon delivery of the photovoltaic modules on site, they shall be sampled randomly and tested for performance through an approved testing agency assigned by GIPCL. The result of such testing agency shall be binding to both the parties and shall be considered final performance measurement report for the guarantee / warrantee conditions of this contract.

6.32.3 In case of underperformance or rejection of the photovoltaic modules during above inspection or during operational life time of project, GIPCL shall notify the Contractor of such underperformance or rejection by email or in writing.

- (i) Consecutively, the Contractor shall immediately replace such PV modules by supplying a new PV modules of similar specification conforming to the required performance criteria and warranty to GIPCL within a period of 10 days from the date of intimation by email or written notice.
- (ii) Upon receipt of the new PV module by the Company, the Contractor shall arrange to collect the rejected/defective photovoltaic module from site.
- (iii) The cost of transportation of the PV modules from the supplier to the site of GIPCL, and return shall be borne by the Contractor.



- 6.32.4 GIPCL shall have the right to serve notice in writing to the Contractor on any grounds of objections, which he may have in respect of the work. The Contractor has to satisfy the objection, otherwise, the Owner at his liberty may reject all or any component of plant or workmanship connected with such work.
- 6.32.5 The Contractor shall issue request letter to GIPCL or his authorized representative for testing of any component of the plant, which is ready for testing at least fifteen (15) days in advance from the date of actual date of testing at the premises of the Contractor or elsewhere. When the inspection and the tests have been satisfactorily completed at the Contractor's works, GIPCL shall issue a certificate to that effect. However, the Owner at its own discretion may waive the inspection and testing in writing under very special circumstances. In such case, the Contractor may proceed with the tests which shall be deemed to have been made in GIPCL's presence, and it shall forthwith forward six (6) sets of duly certified copies of test results and certificates to the Company for approval of the Company. The Contractor, on receipt of written acceptance from GIPCL, may dispatch the equipment for erection and installation.
- 6.32.6 For all tests to be carried out, whether in the premises of the Contractor or any Subcontractor or the supplier, the Contractor, shall provide labour, materials, electricity, fuel, water, stores, apparatus and instruments etc. free of charge as may reasonably be demanded to carry out such tests of the plant in accordance with the Contract. The Contractor shall provide all facilities to GIPCL or its authorized representative to accomplish such testing.
- 6.32.7 The Owner or his authorized representative shall have the right to carry out inward inspection of the items on delivery at the Site and if the items have been found to be not in line with the approved specifications, shall have the liberty to reject the same.
- 6.32.8 If the Owner desires, testing of any component(s) of the plant be carried out by an independent agency, the inspection fee, if any, shall be paid by the Owner. However, the Contractor shall render all necessary help to GIPCL whenever required free of charge.
- 6.32.9 The Contractor has to provide the necessary testing reports to GIPCL as and when required.

6.32.10 Neither the waiving of inspection nor acceptance after inspection by GIPCL shall, in anyway, absolve the Contractor of the responsibility of supplying the plant and equipment strictly in accordance with specification and drawings etc.

6.32.11 If any item is not found conforming to standards during test / inspection, the same shall be replaced / rectified by Contractor without any cost to Owner and shall be re-offered for inspection.

6.32.12 The work is subject to inspection at all times and at all places by Owner. The Contractor shall carry out all instructions given during inspection and shall ensure that the work is carried out according to the relevant codes of practice.

6.32.13 Decision of the Owner in regard to the quality of work and materials and performance to the specifications and drawings shall be final.

6.33 Authorized Test Centres

6.33.1 The PV modules, inverters, transformers, panels, wires, etc. deployed in the power plants shall have valid test certificates for their qualification as per above specified IEC/ BIS Standards by one of the reputed labs of the respective equipment (preferably NABL Accredited Test Centres) in India. In case of module or other equipment for which such Test facilities may not exist in India, test certificates from reputed ILAC Member Labs abroad will be acceptable.

6.34 Delivery of Equipment

6.34.1 The Contractor shall deliver the equipment of the plant and machineries in accordance with the terms of the Contract at the time(s) to the place(s) and in the manner specified in the Contract. The Contractor shall comply with instructions that may be given by the Owner from time to time regarding the transit of the plant and material.

6.34.2 Notification of delivery or dispatch in regard to each and every consignment shall be made to the Owner immediately after dispatch or delivery from the manufacturing works. The Contractor shall supply to the consignee Invoice in triplicate and packing account of all stores delivered or dispatched by him.

6.34.3 In case of any occurrence of loss or damage in transit, it shall be the liability of the Contractor to initiate or pursue the claim with the Insurance Company. It should take immediate steps to repair the damaged apparatus or replacement there to.

6.35 Liabilities during Transit

6.35.1 The Contractor shall be responsible for loss, damages, or depreciation to goods or of plant, equipment, and machineries up to delivery at the Site.

6.36 Deduction from Contract Price

6.36.1 All costs, claims, damages or expenses, which the Owner may have paid for which the Contractor is liable, will be deducted by the Owner from deposited bank guarantees or from any money due or which become due to him under this Contract or any contract are being executed elsewhere with the Owner.

6.36.2 Any sum of money due and payable to the Contractor, as per the Contract Agreement, may be appropriated by the Owner and set off against any claim of the Owner, for the payment of a sum of money arising out of or under any other contract made by the Contractor with the Company. It is an agreed term of the Contract that the sum of money, withheld or obtained under this clause by the Company, will be kept withheld or retained as such by the Owner or till this claim arising out of in the same Contract is either mutually settled or determined by the arbitrator, or by competent court, as the case may be, and that the Contractor shall have no claim for interest or damages whatsoever on this account or any other account in respect of any sum of money withheld or retained under this clause and duly notified as such to the Contractor.

6.37 Terms of Payment (For 75 MW (AC) Project)

6.37.1 Supply, Works and 3 years O&M: The Owner shall pay the Contractor in the following manner for supply of material and at the following time for achieving the respective milestones for the Supply. The Tender is a comprehensive EPC Contract of Supply, Works and O&M, There shall be three (3) different contract signed for supply, works and O&M. However a single LoI shall be provided to the Successful Bidder. The payment terms for Supply, Works and O&M is given below.

Terms of payment for Supply

| Sr. | Payment Milestones | Amount |
|-----|--|--|
| 1 | Advance Payment (10% of Supply Price excluding taxes & duties) against (i) Acceptance of LOI (ii) Submission of Advance Bank Guarantee of equivalent amount Submission of Performance Bank Guarantee (validity of minimum 31 months) -10% of the total EPC Contract Price | 10% of Supply Price excluding taxes & duties |
| 2 | Completion of Erection of MMS Column Post including civil Foundation of each 5 MW or More (AC) Block | 10% of Supply Price |
| 3 | Supply of PV Modules on pro rata basis, for each 10 MWp (Supply of PV Modules shall be as per mutually agreed schedule on sequential basis only) payment through LC upon receipt of PV Modules at site for Domestic Modules and at any Indian Port for imported Modules | 45% of Supply Price |
| 4 | Supply of BOS on each 5 MW or More(AC) Block on Pro rata basis except Sr. No.2 | 10% of Supply Price |
| 5 | Completion of Erection & installation of each 5 MW (AC) Block | 10% of Supply Price |
| 6 | Upon achieving Commissioning / COD of the Plant with GEDA / GUVNL | 5% of Supply Price |
| 7 | Upon Completion of the Facilities and Successful Performance and Operational Acceptance Test | 5% of Supply Price |
| 8 | On completion of all Punch points, submission of O&M Documents and handing over of the plant to O&M complete in all respect. | 5% of supply Price |

Note:

1. **“Supply Price” is equal to the price of Supply of all equipment portion under “EPC Supply-Contract Price” (including taxes of Price Schedule) quoted by the Contractor in its Financial Proposal.**
2. Supply payment are subject to receipt of goods at site.
3. GIPCL may consider Option for payment through LC (INR) for Supply of PV Module.
4. Payment against supply of PV modules shall be on sequential basis after readiness of module mounting structure as indicated in best effort schedule
5. 5 MW Block capacity is indicative, Completion of One block means Completion of Erection & Installation of Complete DC Circuit and AC Circuit up to main Control Room HT panel.
6. If the Block size is different than 5 MW, payment will be considered on pro rata basis for relevant Block size.

6.37.2 Payment Terms for the Works shall be as per the following table. The Owner shall pay the Contractor in the following manner for all the erection, testing, commissioning.

Terms of payment for Works

| Sr. | Milestone for Works | Amount |
|-----|--|--|
| 1 | Mobilization Advance Payment: Against mobilization at site and submission of BG of equivalent amount | 10 % of Contract Value of Works (Excluding taxes & duties) |
| 2 | Against monthly RA bills for the Works executed at site | 60 % of Contract Value of Works |
| 3 | Pro-rata upon part Commissioning Trance Size: 25 MW (AC) + 25 MW (AC) + 25 MW (AC) | 10 % of Contract Value of Works |
| 4 | Upon Successful Commissioning of the entire Project Against PV Module Bank Guarantee (if PV Module insurance is not available) | 10 % of Contract Value of Works |
| 5 | Upon Successful OAT | 5 % of Contract Value of Works |
| 6 | On completion of all Punch points, submission of O&M Documents and handing over of the plant to O&M complete in all respect. | 5% of Contract Value of Works |

Note: “Erection, Testing and Commissioning Works Price” is equal to the price of Works (all the erection, testing and commissioning works) portion of “EPC Contract Price” (including taxes) quoted by the Contractor in its Financial Proposal.

Terms of payment for Operation and Maintenance (O&M)

| Sr. | Milestone for Works | Amount |
|-----|---|--|
| 1 | On Successful Operation and Maintenance of the Solar PV Power Plant on quarterly basis for each year till 3 years | Year 1: OM-1 Year 2: OM-2 Year 3: OM-3 |

6.37.3 Escrow Account:

EPC contractor shall essentially utilize all the funds released by GIPCL for the contracted Project(s) only and the said funds shall not be diverted for any other purpose. If it is observed that at any stage Project activities are getting delayed due to delay in payment to suppliers, subcontractors etc. then in such case, GIPCL shall reserves the right to ask EPC contractor to open ESCROW account and all the payment made by GIPCL shall be

deposited in the ESCROW account to ensure timely payment to various agencies associated with the Project. The detailed modus operandi shall be decided by GIPCL.

6.38 Payments Procedure

6.38.1 Subject to any deduction which the Owner may be authorized to make under this Contract, and or to any additions or deductions provided for in this Contract, the Contractor shall be entitled to payment as follows:

- a. All payments shall be made in Indian Rupees (INR), unless otherwise specified in the LoI/Contract Agreement. All payment shall be made on the basis of actual measurement for the quantified items as per schedule of works.
- b. The Contractor shall submit the bill for claim in three copies with all supporting documents as per the Contract condition to GIPCL. After due verification and recommendation, GIPCL shall process verified bills for release of payment. Payments shall be released in 30 (Thirty) days by A/c payee cheque / RTGS/ NEFT from date of submission of clear invoice.
- c. The Contractor shall give complete shipping information concerning the weight, size, content of each package including any other information the Owner, may require.

(1) For offshore supplies by any Bidder, following documents shall be air-mailed to the OWNER within (7) days from the date of shipment. The advance copy of these documents shall be sent through e-mail. :

- i. Insurance certificates (six copies)
 - ii. Bill of lading (5 non-negotiable copies)
 - iii. Invoice (6 copies)
 - iv. Packing list (6 copies)
 - v. Test certificate (3 copies)
 - vi. Certificate of Origin (six copies)
 - vii. One copy of the packing list shall also be enclosed in each case.
 - viii. O & M Manuals &/or Catalogues
- d. The Contractor shall submit the bill / invoice for the work executed showing separately GST and any other statutory levies in the bill / invoice.



- e. Any discrepancy and delay in submission of the above document, which result in demurrage and other charges for the consignment (for incomplete/incorrect documentation) will be to the account of the Bidder. All the formalities for custom clearance are in Bidder's scope.

(1) For onshore supply, the following documents shall be submitted through registered post to the Owner within 3 days from the date of shipment, the advance copy of these documents shall be sent through e-mail.

- i. Invoice (4 copies)
 - ii. LR copies
 - iii. Packing list (4 copies)
 - iv. Test Certificate (3 copies)
 - v. One copy of the packing list shall also be enclosed in each case.
 - vi. O & M Manuals &/or Catalogues
- f. All taxes and deductions shall be applicable as per prevailing income tax and other statutory rules and provisions in force.
- g. In case Contractor fails to submit the invoice with all the required documents to process payments, GIPCL reserves the right to hold the payment of the Contractor against such bills.
- h. The Ownershall consider only supply part payment for PV Modules through Letter of Credit (LC) as per the Terms of Payment specified in this tender. Respective charges for LC opening and other bank charges shall be borne by the EPC Contractor / Owner.

6.39 Warranty/ Guarantee

6.39.1 The Plant shall perform as per the Guaranteed Performance indicated by the Bidder in its Financial Proposal.

6.39.2 PV modules used in grid connected solar power plants must be warranted for peak output power at Standard Testing Condition (STC), which shall not be less than 90% at the end of ten (10) years and not less than 80% at the end of twenty five (25) years. The first year degradation shall not be more 2.5% of the PV Module capacity and in subsequent years it shall not be more than 0.7% per annum.

6.39.3 Warranty, Guarantee & Defect liability: All plant equipments and components and overall workmanship of the grid solar power plants shall be warranted for a minimum of 5 years except solar PV Modules which product warranty shall be for 10 years and performance warranty shall be for 25 years.

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

6.39.5 Void

6.39.6 During the period of Warranty/ Guarantee the Contractor shall remain liable to replace/ repair any defective parts, that becomes defective in the Plant, of its own manufacture or that of its Subcontractors, under the conditions provided for by the Contract under and arising solely from faulty design, materials or workmanship, provided such defective parts are not repairable at Site. After replacement the defective parts shall be returned to the Contractors works at the expense of the Contractor unless otherwise arranged.

6.39.7 At the end of Guarantee period, the Contractor's liability shall cease. In respect of goods not covered above, GIPCL shall be entitled to the benefit of such Guarantee given to the Contractor by the original Contractor or manufacturer of such goods.

6.39.8 During the Operation and Maintenance and Guarantee period, the Contractor shall be responsible for any defects in the work due to faulty workmanship or due to use of sub-standard materials in the work. Any defects in the work during the guarantee period shall therefore, be rectified by the Contractor without any extra cost to GIPCL within a reasonable time as may be considered from the date of receipt of such intimation from GIPCL failing which GIPCL shall take up rectification work at the risk and cost of the Contractor.

6.39.9 Material Warranty and Comprehensive AMC:

Material Warranty is defined as: 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 GIPCL:

- Defects and/or failures due to manufacturing defects and/or failures due to materials, including PID defect
- Non-conformity to specifications due to faulty manufacturing and/or inspection processes.

If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at GIPCL's sole option.

(a) Performance Warranty:

The manufacturer should warrant the output of Solar Module(s) If, Module(s) fail(s) to exhibit such power output in prescribed time span, the Contractor will either deliver additional PV Module(s) to replace the missing power output with no change in area of land used or repair or replace the PV Module(s) with no change in area of land used at GIPCL's sole option. Total land available from GIPCL is fixed and the bidder shall design the plant so that in this case he has enough space within this land to accommodate additional capacity.

| Equipment/System | Comprehensive AMC* |
|------------------|--------------------|
| Inverter | 10 Years |
| SCADA | 10 Years |

**Starts from COD with GEDA/GUVNL*

Bidder has to take Comprehensive Annual Maintenance Contract (AMC) from Original Equipment Manufacturer (OEM) **or OEM authorized service provider** for a period of 10 years for the following components:

- PCU System / Inverter: Replacement of spares like inductors, capacitors, electronic cards as per OEM recommendations
- SCADA

Comprehensive AMC shall include all preventive maintenance and breakdown maintenance including replacement of any component to ensure that equipment is working satisfactorily as per design/system requirement. During AMC period, the

OEM or its representative are required to visit at least once a year or as per OEM recommendation cycle for periodic maintenance. During AMC period, the OEM is required to respond within one working day through telecom or any electronic mean. In case of breakdown of the system, OEM has to send their representative within 72 hours. For the minor faults not hampering the generation e.g. communication, display etc., the OEM has to get the fault rectified within 7 working days. Replacement of equipment/spare parts/ updating of softwares being phased out or not being supported by OEM's is also included in bidder's scope. Contractor shall be responsible to carry out all test and work as required by statutory regulation in effect as on date of Techno-commercial bid opening during O&M period. Failure from the OEM to adhere the activity and the time schedule may lead to BG encashment.

6.39.10 Insurance or Bank Guarantee

A) Bank Guarantee:

Bank Guarantee against PV Modules Warranty: The Successful Bidder shall provide security in form of Bank Guarantee for an amount as specified in Clause No. 3.11.6 (iii) from the start date of O&M Period. However, the Bidder can submit BG valid for 5 years and further extend it for another 5 years. The BG shall be submitted prior to the return of PBG under the subject package.

<Or>

B) **Insurance:** The PV module power output warranty as per the technical specification shall be insured and backed up through an insurance policy by a reputed insurance company which will cover against the PV module power output warranty in case of insolvency or bankruptcy of the PV module manufacturer. The Bidder shall submit a suitable insurance from Third Party. GIPCL reserves right to accept or reject Insurance company based on its credential, market feedback etc.

6.40 Arbitration

6.40.1 All matters, questions, disputes, differences and / or claims arising out of and / or concerning, and /or in connection with, and /or in consequence of, and /or relating to this contract which may arise between the parties in connection with the Contract or any matter arising out of or in relation thereto shall be reported to Gujarat Public Work Contract

Dispute Arbitration Tribunal and provision of Gujarat Public Work Contract Disputes Arbitration and Tribunal Act 1996 shall be applied as updates time to time.

6.40.2 The Contractor shall ensure that the work under this Contract shall continue during arbitration proceedings and dispute and no payments due from or payment by the Owner shall be withheld on account of such proceedings except to the extent which may be in dispute.

6.40.3 The Arbitrator may, from time to time, with the consent of the parties to the contract enlarge the time for making the award. The venue of the arbitration shall be the place from which the acceptance of offer is issued or such other place as the Arbitrator, in his discretion, may determine.

6.41 Court of Competent Jurisdiction

6.41.1 The Courts of Vadodara for GIPCL shall have exclusive jurisdiction in all matters arising under the Contract.

6.42 Law and Procedure

6.42.1 The law which is to apply to the Contract and under which the Contract is to be construed shall be Indian Law.

6.42.2 The law governing the procedure and administration of any arbitration instituted under the clause for arbitration shall be the Indian law.

6.43 Construction of Contract

6.43.1 The Contract shall in all respect be construed and operated, as a Contract as defined in the Indian Contracts Act, 1872, and all the payments there under shall be made in Indian Rupees unless otherwise specified.

6.44 Notices

6.44.1 For all purpose of the Contract, including arbitration there under, the address of the Contractor mentioned in the Bid shall be the address to which all communications addressed to the Contractor shall be sent, unless the Contractor has notified a change by a separate letter containing no other communication and sent by registered post with acknowledgement due to GIPCL. The Contractor shall be solely responsible for the consequence of an omission to notify change of address in the manner aforesaid.

6.44.2 Any communication or notice on behalf of the Owner in relation to the Contract Agreement may be issued to the Contractor by the Owner and all such communication and notice may be served on the Contractor either by registered post or under certificate of posting or by ordinary post or by hand delivery at the option of the officer.

6.44.3 Instructions or notices to the Contractor and notices from the Contractor to GIPCL recorded in a minute signed by the authorized representatives of both GIPCL and the Contractor. Such notice or instruction shall be valid notice of instruction for the purpose of the Contract.

6.45 Final Bill

6.45.1 The Final EPC Bill relating to the Contract shall be prepared only after the Performance Guaranteed Test of the plant has been observed as under Clause No. Appendix 16: Procedure for Performance Testing and it will include the adjustments of all claims against the Contractor by the Owner and awarded in its favour by the arbitrator up to the date of preparation of the final bill.

6.46 Degradation of Solar Modules

6.46.1 The Contractor should warrant for the output of each Solar Module(s) for at least 90% of its actual rated capacity at Standard Testing Condition after initial 10 years and 80% of its rated capacity after 25 years upon commissioning of the Plant.

6.46.2 The derating of module should not be more than 0.7% in any year except for the first year of operation, which should be limited to 2.5%.

6.46.3 If, Module(s) fail(s) to exhibit such power output, the Contractor will either:

- a. Deliver additional PV Module(s) to replace the loss of power output with no change in area of land used;

<Or>

- b. Repair or replace the existing PV Module(s) with no change in area of land used; <or>
- c. Compensate GIPCL with an amount equivalent to the loss of revenue from the date of audit to 25th years which shall be calculated based on Net Present Value of amount of loss of revenues from the date of audit to 25th years discounted at the rate of GIPCL's cost of capital.



6.46.4 The Owner will specifically do the audit of solar PV module by third-party at any point of the operation period and in case the Contractor fails to demonstrate the value as per the maximum deration allowed then, the Contractor shall compensate as per the Clause no.6.46.3.

6.47 Risk Purchase

6.47.1 If the Contractor fails, on receipt of the LoI, to take up the work within a reasonable period or leave the work Site after partial execution of the work, GIPCL shall have the liberty to get the work done through other agency at the Contractor's own risk and additional cost if any. If the situation, so warrants, to compel GIPCL to cancel the LoI placed on the Contractor, it shall be liable to compensate the loss or damage, which GIPCL may sustain due to reasons of failure on Contractor's part to execute the work in time.

6.48 Confidential Information

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

6.48.2 Notwithstanding the generality of the foregoing Clause 6.48.1 all maps, plans, drawings, specifications, schemes and the subject matter contained therein and all other information given to the Contractor, by the Company in connection with the performance of the Contract shall be held confidential by the Contractor and shall remain the property of the Company and shall not be used or disclosed to third parties by the Contractor for any purpose other than for which they have been supplied or prepared. The Contractor may disclose to third parties, upon execution of secrecy agreements satisfactory to the Company, such part of the drawings, specifications or information if such disclosure is necessary for the performance of the Contract under this Clause of 6.48.



- 6.48.3 Maps, layouts and photographs of the unit/integrated plant including its surrounding region's showing vital installation for national security shall not be published or disclosed to the third parties or taken out of the country without prior written approval of the Company and upon execution of secrecy agreements satisfactory to the Company with such third parties prior to disclosure.
- 6.48.4 Title to secret processes, if any, developed by the Contractor on an exclusive basis and employed in the design of the unit shall remain with the Contractor. The Company shall hold in confidence such process and shall not disclose such processes to the third parties without prior approval of the Contractor and execution by such third parties of secrecy agreements satisfactory to the Contractor prior to disclosure.
- 6.48.5 Technical specifications, drawings, flow sheets, norms, calculations, diagrams, interpretations of the test results, schematics, layouts and such other information which the Contractor has supplied to the Company under the Contract shall be passed on to the Company. The Company shall have the right to use these for construction erection, start-up, commissioning, operation, maintenance, modifications and/ or expansion of the unit including for the manufacture of spare parts.
- 6.48.6 The obligation of a party under this Clause 6.48, however, shall not apply to that information which:
- a. now or hereafter enters the public domain through no fault of that Party,
 - b. can be proven to have been possessed by that Party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other Party hereto, or
 - c. Otherwise lawfully becomes available to that Party from a third party that has no obligation of Confidentiality.
- 6.48.7 The above provisions of this Clause 6.48 shall not in any way modify any undertaking of Confidentiality given by either of the Parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof.
- 6.48.8 The provisions of this Clause 6.48 shall survive Termination, for whatever reason, of the Contract.



6.49 Limitation of Liability (LLP)

6.49.1 The total liability of the Contractor under or in connection with this Tender and the consequent Contract shall not exceed the full EPC Contract Price inclusive of taxes and duties.

6.49.2 This sub-Clause shall not limit the liability in case of fraud, deliberate default/ negligence, reckless misconduct or illegal or unlawful acts by the Contractor.

--- End of Section ---

7. Special Terms and Condition

7.1 Definition

- 7.1.1 The General Terms and Conditions as well as the Special Terms and Conditions of the Tender are complementary to each other, and wherever there is a conflict, the Special Terms and Conditions shall prevail.
- 7.1.2 Objective of the Project The main objective of this project is “Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Comprehensive Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75 MW (AC) on EPC basis near Suart Lignite Power Plant of GIPCL, Dist.: Suart, Gujarat.

7.2 Compliance with GUVNL/GETCO/GEDA Guidelines

- 7.2.1 The Bidders and Contractor shall make themselves fully aware of and comply with the norms and guidelines provided by GUVNL/GETCO/GEDA if any, towards the Project.
- 7.2.2 The Contractor shall ensure that the Project shall comply with all the norms and guidelines of GUVNL/GETCO/GEDA if any, and subsequent clarifications or amendments issued from time to time. The Contractor is required to refer the compliance documents of GUVNL/GETCO/GEDA if any, for necessary compliances of GUVNL/GETCO/GEDA requirements.
- 7.2.3 In case of any conflict between the compliance of GUVNL/GETCO/GEDA and this Tender or any aspect of the Project, the Contractor shall immediately notify GIPCL for clarity.

7.3 Project Site

- 7.3.1 Details of the Project Sites will be as per the Annexure 1.

7.4 Scope of Service

- 7.4.1 The item of work to be performed on all equipment and accessories shall include but not limited to the following:
- Transportation, unloading, receiving and storage at site.
 - Arranging to repair and/or re-order all damaged or short-supply items.
 - Final check-up of equipment and commissioning and putting the system into successful operation, feeding power to the local internal grid.

7.5 Training of GIPCL's Personnel

- 7.5.1 The Bidder shall provide training on Plant operations and maintenance to three (3) teams of 5-10 personnel each (Engineers and Technician/ Operators) of GIPCL as and when requested by GIPCL.

7.6 Mode of Execution

- 7.6.1 All the work shall be executed on EPC basis in strict conformity with the provisions of the Contract documents explanatory detailed drawings, specifications and instructions by the Engineer-in-Charge whether mentioned in the contract or not. The contractor shall be responsible for ensuring that works are executed in the most substantial, proper and workman like manner using the quality materials and labour throughout the job Completion in strict accordance with the specifications and to the entire satisfaction of the Engineer-in-Charge. Any discrepancy/ambiguity found during erection and commissioning at site, decision of GIPCL will be final.
- 7.6.2 The entire work shall be executed on EPC basis. Any minor item(s) not included in the schedule but required for completion of the work shall have to be carried out/ supplied without any extra cost. Such works, not listed in the schedule of works but elaborately described to perform or to facilitate particular operation(s) required for completion of the project shall be deemed to have been included in the scope of this work and the Contractor shall supply, install the same without any extra cost.

7.7 Programme of Work

- 7.7.1 The Contractor shall submit the programme of work within 15 days from the date of receipt of Letter of Intent. The programme shall include a Bar Chart indicating there in the starting position and completion date of each of the major items of work.

7.8 Starting of Work

- 7.8.1 The Contractor shall be required to start the work within 15 (fifteen) days from the date of issue of Letter of Intent and shall thereof, report to GIPCL accordingly.

7.9 Completion Schedule

- 7.9.1 The time of completion and Commissioning of the Plant is Four Hundred Eighty Five Days (485) from the date of issue of Letter of Intent. The O&M Contract Period is for three (3) years.

7.9.2 The Contractor shall inform GIPCL at least thirty (30) days advanced preliminary written notice and at least fifteen (15) days advanced final written notice, of the date on which it intends to synchronize the Power Project to the Grid System.

7.9.3 The Contractor shall prepare the completion schedule accordingly and in conformity with provisions of technical specifications and carry out the work as per this schedule subject to “Force Majeure” conditions. The Contractor shall mobilize resources keeping in view, the above scheduled completion period.

7.9.4 The Contractor shall provide the power evacuation schedule as and when required or asked by any Central or State Government agency(s).

7.10 Site Inspection & Basis of Bid

7.10.1 The volume and quantity of work indicated in schedule of works may vary. The Contractor should visit the Site before quoting rate for civil works. After taking in to consideration all aspects of the site, condition of soil etc., the Contractor should quote for civil works. No extra claim will be entertained at post bidding stage. The foundation design of module structure and the building shall have to be approved by GIPCL. In case of any defects arising in the building during guarantee period, the Contractor shall have to rectify the same at its own cost.

7.11 Price Escalation

7.11.1 The rate(s) quoted against the work shall remain firm during the entire Contract period.

7.12 Taxes and Duties

7.12.1 The price quoted shall be inclusive of all applicable taxes, duties, levies as applicable (as per the format of the Financial Proposal), which shall be paid on production of documentary evidences for the same.

7.12.2 Bidders shall quote the rates as well as all taxes and duties based on the concessional exemption that can be availed by the Bidder.

7.12.3 Statutory variations in the tax shall be permitted as under:

(A) Statutory variations during original contractual completion period :

(i) If any increase takes place in taxes and duties due to statutory variation (including

Safeguard Duty on PV Module only), then GIPCL shall admit the same on production of documentary evidences.

- (ii) If any decrease takes place in taxes and duties due to statutory variation, the same shall be passed on to GIPCL or GIPCL shall admit the decreased rate of taxes and duties while making the payment.
- (iii) In case of imposition of or continuation of Safeguard Duty or Basic Custom duty (BCD) on PV modules, then GIPCL shall admit the same on production of documentary evidences as required by GUVNL. The reimbursement of Duty shall be calculated/admitted considering basic value of PV module or actual payment by contractor whichever is lower. Basic Custom Duty as per MNRE OM dtd: 09.03.2021 will not be reimbursable as contractor has to bid considering the BCD as per MNRE OM Dtd: 09.03.2021

(B) Statutory variations beyond original contractual completion period:

- (i) If reasons for extension of contractual completion period is attributable solely to GIPCL, the provisions of (A) (i) above shall apply.
- (ii) If reasons for extension of contractual completion period is attributable to Bidder, then:
 - (a) If any increase takes place in taxes and duties due to statutory variation, then GIPCL shall not admit the same; however, GIPCL shall admit the taxes and duties at the rate prevailing during payment of last invoice raised during original contract completion period.
 - (b) If any decrease takes place in taxes and duties due to statutory variation, the same shall be passed on to GIPCL or GIPCL shall admit the decreased rate of taxes and duties while making the payment.

7.12.4 Variation on account of exchange rate will not be payable. No statutory variation shall be payable by GIPCL on the input items. i.e. raw materials etc.

7.12.5 No statutory variation shall be admitted if the excise duty becomes payable because of exceeding of the prescribed limits for turnover of the Bidder.

7.13 Procurement of Materials

7.13.1 The Contractor shall procure all necessary material required for the project work and arrange to store them properly. Test certificate in accordance with the specifications are to be furnished by the Contractor to GIPCL for approval in respect of the materials procured by the Contractor.

7.14 Samples

7.14.1 Apart from adhering to special provision made in the specification regarding submission of samples, the Contractor shall within fifteen (15) days of its receipt of Letter of Intent, provide to GIPCL samples along with detailed literature of all materials it proposes to use irrespective of the fact that specific make/ material might have been stipulated. If certain items proposed to be used are of such nature that samples cannot be presented or prepared at Site, detailed literature / test certificate of the same shall be provided instead. GIPCL shall check the samples and give his comments and/or approval to the same.

7.15 Notice of Operation

7.15.1 The Contractor shall not carry out important operation without the consent in writing of GIPCL or his representative. For carrying out such important activity, the Contractor shall intimate to GIPCL at least seventy-two (72) hours before starting of the job.

7.16 Rejection of Materials

7.16.1 GIPCL's decision in regard to the quality of the material and workmanship will be final. The Contractors at its own cost and risk without any compensation shall immediately remove any material rejected by the Project Manager or Engineer-in-Charge from the Site of work.

7.17 Power and Water Supply during Construction

7.17.1 The Contractor shall arrange for the temporary Power Supply at the site for construction purpose at its own cost.

7.17.2 Cost of water shall be as per prevailing rate and to be borne by the Contractor.

7.17.3 Cost of electricity required during construction shall be payable by the Contractor. For construction, temporary connection from Distribution Company shall be arranged by the Contractor as per applicable tariff.

7.17.4 GIPCL shall not provide facility for storage of material, and accommodation for labours at site. The Contractor shall make his own arrangement for the same.

7.18 Labour Engagement

7.18.1 The Contractor shall be responsible to provide all wages and allied benefits to its labours engaged for execution of the project work and also to carry out Operation and Maintenance service. The Contractor shall remain liable to the authorities concerned for compliance of the respective existing rules and regulations of the government for this purpose and shall remain liable for any contravention thereof.

7.18.2 Strict adherence of various applicable labour laws like the Factories Act, Minimum Wages Act, ESI Act, Payment of Wages Act, the Workman's Compensation Act, EPF Act, Contractor labour (Regulation & Abolition) Act, 1970 and all other statutory requirements as amended from time to time to the entire satisfaction of Central/State Govt. Authorities, shall be the responsibility of the Contractor and he shall have to make good loss, if any, suffered by GIPCL on account of default in this regard by the Contractor.

7.18.3 The contractor is encouraged to use local manpower as per the local statutory (labour) requirement, if any.

7.18.4 The successful Bidder shall obtain license under Contract Labour (Regulation & Abolition) Act 1970, read with rules framed there under and furnish the same to the Company within 15 days of the issue of Detailed order of Contract failing which the detailed order of contract shall be cancelled/terminated without any further notice and its EMD and/ or performance guarantee shall be forfeited.

7.18.5 65% of the jobs that will be created due to the projected in the supervisory and managerial cadres and 80% of the jobs that will be created in other cadres due to the project shall be filled in by employing the local persons. The expression "local person" shall mean a person domicile in Gujarat state for a minimum period of 15 years prior to applying for employment to the Contractor.

7.19 Handing Over –Taking Over

7.19.1 After completion of Project implementation by EPC Contractor [75 MW (AC)], EPC Contractor to intimate the same to GIPCL and subsequently, GIPCL will check as per terms and conditions of EPC tender and will give Punch points to EPC Contractor, which



shall be attended by EPC Contractor. Further after commissioning, the Contractor shall submit the following for considering final payment:

- a. All as- Built Drawings;
- b. Detailed Engineering Document with detailed specification, schematic drawing, circuit drawing and test results, manuals for all deliverable items, Operation, Maintenance & Safety Instruction Manual and other information about the project;
- c. Bill of material; and
- d. Inventory of spares at projects Site.
- e. Copies of all warranties/guarantees.

7.19.2 Immediately after Commissioning, EPC Contractor to perform Operation & Maintenance for a period as mentioned in the Tender.

7.19.3 Prior to the handing over, GIPCL shall conduct a plant audit by self or the third party as per GIPCL's discretion, and any defects identified during such audits or inspection shall be rectified by the Contractor at its own cost prior to the completion of the O&M period.

7.20 Termination on the death of Contractor

7.20.1 Without prejudice to any of the rights or remedies under this contract, if the Contractor dies, the Engineer-in-Charge on behalf of GIPCL shall have the option of terminating the Contract without compensation to the contractor.

7.21 Retired Government servants taking to Contract

7.21.1 No engineer of gazette rank or other gazette officer employed in engineering or administrative duties in the Engineering Department of the Company is allowed to work as contractor for a period of two years of his retirement from Company's service without the previous permission of the Company. This contract is liable to be cancelled if either the contractor or any of his employees is found at any time to be a person who had not obtained the permission of the Company as aforesaid before submission of the tender or engagement in the contractor's service as the case may be.

7.22 EPF

7.22.1 The contractor will deduct and deposit EPF of his labour staff/worker as applicable from time to time in his own EPF A/c code and then produce a photocopy of documentary evidence of EPF Challan with each R.A. Bill for the concerned period.

7.23 Miscellaneous

- 7.23.1 The project manager appointed by EPC contractor shall not be replaced without the prior written approval of GIPCL.
- 7.23.2 Any project manager or member of the Contractor at Site shall be replaced within a period of forty eight (48) hours of intimation by GIPCL without assigning any reason thereof.
- 7.23.3 The Contractor shall take care of all statutory, local clearance, approvals, etc.
- 7.23.4 All warranties on the equipment shall be in the name of GIPCL with reference to the Clause No. 6.39.
- 7.23.5 The Contractor shall be responsible for claiming and retaining any subsidy and shall quote only final price and responsibility of Project registration/ applications etc. shall lie with the Bidder only. In no case, GIPCL is responsible to provide any additional amount other than the EPC Contract Price & O&M Contract Price.
- 7.23.6 The Contractor shall provide arrangement for water drainage, which shall be appropriately arranged for dispersion/ evacuation as per the local statutory norms without causing any local inconvenience or hindrance.
- 7.23.7 The design philosophy and related specifications mentioned in this Tender are to be treated as baseline specifications. The Contractor may further improve the design of the Plant through minor modifications and execute the same contingent on GIPCL's approval of the new design or specification.
- 7.23.8 Based on reviewing the Project, if the progress is below expectation as judged based on GIPCL's 's discretion, then GIPCL shall reduce the Scope of the Contractor in part or full and assign the same to other contractor(s) at the risk and cost of the existing Contractor.
- 7.23.9 The Contractor shall continue to provide all the monitoring services, licenses, software, access to all information (real-time or stored) that were been used during the O&M Contract period by the Contractor to GIPCL at the time of hand over at no extra cost to GIPCL for the rest of the life of the Plant.



7.23.10 The Contractor shall construct a dedicated site office including tables, chairs, functional power outlets, light, fan air conditioner, etc. for at least eight (8) people to host GIPCL's employees or authorized representatives at the time of construction of the Plant.

7.23.11 Provision for installing any additional monitoring equipment to facilitate on-line transfer of data shall be provided by the Contractor.

7.23.12 GIPCL shall provide necessary support to the Contractor for the high-sea sales of the PV modules.

--- End of Section ---

Appendix 1: Format for Covering Letter

To,

Shri S.N. Purohit
CHIEF GENERAL MANAGER (RE & BO)
Gujarat Industries Power Company Limited
PO: Ranoli-391350,
Dist.: Vadodara, Gujarat, India

Sub: Submission of the RFP Document No. GIPCL/ Solar/EPC/2022/ 75 MW (AC) Solar dated 21st Jan, 2022.

Dear Sir,

We, the undersigned, have considered and complied with the "Instructions to Bidders" and have accepted the terms stipulated in the RFP documents. The scope of work to be offered by the Bidder shall include but not be limited to Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat, in the State of Gujarat. The Successful Bidder shall be required to ensure the continuous running of plant without any interruption for a period of One year. All the above shall be as per RFP Document No. **GIPCL/Solar/EPC/2022/75 MW (AC) Solar dated 21st January, 2022.**

Also we have familiarized ourselves with the, land surface and subsurface, metrological, climatological and environmental conditions which may exist in the installations area. In full cognizance and compliance with these aforesaid conditions and the regulations of local government authorities, we the undersigned do hereby offer for the Engineering, Procurement, Manufacturing, Construction, Installation, Testing, Commissioning, Operation and Maintenance of a 75 MW (AC) grid-interactive solar photovoltaic power plants using PV technology on a EPC basis near Surat Lignite Power Plant of GIPCL, Dist. Surat in the State of Gujarat for which we have Bid. The work covered under the Bid shall be completed to the entire satisfaction of yourselves or your representative in conformity with the RFP documents at the prices accompanying this Bid.



It is a term of our Bid that the Project shall be handed over installed, interconnected, tested, commissioned and modified and shall achieve Commissioning not later than 485 (Four Hundred Eighty Five) days from the date of LOI. This shall be the essence of the Contract between us.

We further agree and stipulate as follows:

1. Until the final Contract Documents are prepared and executed the RFP documents with any modifications, additions, deletions agreed with the Company(s) and your written acceptance thereof, shall constitute a binding Contract between us, upon terms contained in aforesaid documents and the Financial Proposal accompanying the Bid.
2. That the Company will not supply any material. In all respects we shall be fully self-sufficient in the performance of the work.
3. I/ We understand that you are not bound to accept the lowest of the Bid you may receive.
4. I/ We shall make available to the Company any additional information it may find necessary or require to supplement or authenticate the qualification statement.
5. I/ We acknowledge the right of the Company to reject our Bid without assigning any reason or otherwise and hereby waive, to the fullest extent permitted by applicable law, our right to challenge the same on any account whatsoever.
6. I/ We understand that you may cancel the bidding process at any time and that you are neither bound to accept any Application that you may receive nor to invite the Applicants to Bid for the Project, without incurring any liability to the Applicants.
7. I/ We further certify that in regard to matters relating to security and integrity of the country, we or any of our Associates have not been charge-sheeted by any agency of the Government or convicted by a Court of Law.
8. I/ We further certify that no investigation by a regulatory authority is pending either against us or against our Associates or against our CEO or any of our directors/ managers/ employees.
9. I/ We undertake that in case due to any change in facts or circumstances during the bidding process, we are attracted by the provisions of disqualification in terms of the provisions of this RFP; we shall intimate the Company of the same immediately.
10. We understand that the selected Bidder shall either be an existing Company incorporated under the Indian Companies Act, 1956 or Companies Act 2013.
11. I/ We hereby irrevocably waive any right or remedy which we may have at any stage at law or howsoever otherwise arising to challenge or question any decision taken by the Company in connection with the selection of Applicants, selection of the Bidder, or in



connection with the selection/ bidding process itself, in respect of the above mentioned Project and the terms and implementation thereof.

12. I/ We agree and undertake to abide by all the terms and conditions of the RFP document.
13. We agree to keep the bidding valid for acceptance for a period of 120 (One Hundred and Twenty) days from the due date of this tender (hereinafter referred to as validity period) and the Bid shall not be withdrawn on or after the opening of bidding till the expiration of the validity period or any extension thereof.
14. We also undertake not to vary/modify the Bid during the validity period or any extension thereof.
15. We represent that we have fully satisfied ourselves as to the nature and location of the Project having in mind the general and local conditions and other factors incidental to the performance of the works and the costs thereof.
16. We further represent that from our own investigation of the Site of the Project we have fully satisfied ourselves as to the character, quality and quantity of surface and other conditions to be encountered in the performance of the works and we understand and represent that any failure to acquaint ourselves in respect of these matters and the other factors and conditions as set forth shall not relieve us from any responsibility for estimating properly the difficulty and cost of successfully performing the works.
17. We also acknowledge and accept that you shall not pay for any discontinuance or low performance rate resulting from malfunction of / or inadequacy of our equipment, instruments or personnel.
18. We agree to return to you all reports and technical data provided for our use in preparing this Bid and in the subsequent conduct of the works. We undertake that we will not use the same for any other work/purpose.
19. We further represent that we have familiarized ourselves with all the terms and provisions of the various parts of the bidding documents and that in making our Bid, we do not rely upon any representation made by any agent or employee of yourselves in respect of the terms of the bidding documents or the nature of the performance of the works.
20. We submit this Bid with the full understanding that our Bid fully complies with all the terms and conditions of the RFP documents including Bid evaluation criteria and that no deviation/exception to the RFP documents have been taken by us. We also agree that in case we have taken any exceptions/ deviations to the RFP documents, the Company will be free to reject our offer on account of such exceptions/deviations.



Dated this _____ day of _____ 20____ (Year)

Signature: _____

In the capacity of: _____

Duly authorized to sign Tenders for and on behalf of (Name & Address):

Witness:



Appendix 2: Details of Bidder

To,

Shri S. N. Purohit
CHIEF GENERAL MANAGER (RE & BO),
M/s. Gujarat Industries Power Co. Ltd.,
PO: Ranoli, Dist. Vadodara-391 350
Gujarat, India.

Sub: RFP Document No. **GIPCL/ Solar/EPC/2022/ 75 MW (AC) Solar** for Development of 75 MW (AC) Solar Power Project near Surat Lignite Power Plant of GIPCL, Dist. Surat, Gujarat, on EPC Basis.

1. (a) Name of the Bidder:
(b) Country of incorporation:
(c) Address of the corporate headquarters and its branch office(s), if any, in India:
(d) Date of incorporation and/ or commencement of business:
(e) GST Number (Copy Attached: Yes/No):
(f) Income Tax Permanent Account No (Copy of PAN Attached: Yes /No):
2. Brief description of company including details of its main lines of business and proposed role and responsibilities in this Project:
3. Details of individual(s) who will serve as the point of contact/ communication for company:
(a) Name:
(b) Designation:
(c) Company:
(d) Address:
(e) Telephone Number:
(f) E-Mail Address:
(g) Fax Number:
4. Particulars of the Authorised Signatory of the Bidder:
(a) Name:
(b) Designation:
(c) Address:

(d) Phone Number:

(e) Fax Number:

5. Solar EPC Contracts execution capacity:

| EPC Contracts executed in MW in Gujarat | | | EPC Contracts executed in MW in India | | |
|---|-----------|------------------|---------------------------------------|-----------|------------------|
| Current Year | Last Year | Second Last Year | Current Year | Last Year | Second Last Year |
| | | | | | |

6. Plant Details:

- a) Location -----
 b) Description -----

7. Details of EPC Solar Project work executed during last 3 years

| Sr. No. | Project details | Capacity /Size of the Plant (MW) | Year of Completion | No. of Orders in hand |
|---------|-----------------|----------------------------------|--------------------|-----------------------|
| | | | | |

8. Details of testing facilities available at works:

- a) List of testing equipment.
 b) Quality Plan for manufacturing and Tests carried out on items offered
 c) Details of the test organization available.

9. 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?

10. Bidder to submit details of qualified manpower for design, engineering, procurement, supply, project execution expertise and experience for development of solar PV power plant.

11. Bidder to submit the company profile with organ gram, manpower details, Bidders manpower for execution of GIPCL's project.

Appendix 3: Format of Details of Similar Technical Experience

INSTRUCTIONS:

- The Bidder shall indicate similar EPC experience of grid-connected solar photovoltaic projects herein.
- The Bidder shall duly attach the Letter of Award (LOA) from the Client, Commissioning Certificate, and Certificate of Satisfactory Completion of Work from the Client.
- Projects without sufficient documentary evidence of execution, commissioning and completion as per the discretion of GIPCL shall not be considered towards technical evaluation of the Bidder.
- The Bidder may indicate more than five (5) projects.

| Sr. No. | Name of Client (with name and contact information of Contact Person) | PV Project AC/ DC Capacity (in MW) | Supporting Documents Attached (YES/ No) | | | |
|---------|---|--|--|---|--|--|
| | | | Copy of LOA or Work order with zero date and completion schedule | Commissioning Certificate or Commissioning Date | Certificate of Satisfactory Completion | CUF Guaranteed Vs Actual of Last Year. |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |

FINANCIAL INFORMATION

FINANCIAL DATA FOR LAST THREE AUDITED FINANCIAL YEAR

| Sr. No. | Description | FY 2018-19 | FY 2019-20 | FY 2020-21 |
|---------|---------------------------|------------|------------|------------|
| 1 | Current Assets | | | |
| 2 | Current Liabilities | | | |
| 3 | Working Capital (1-2) | | | |
| 4 | Annual Turnover | | | |
| 5 | Paid up share capital | | | |
| 6 | Free Reserves and Surplus | | | |
| 7 | Net Worth of Bidder Funds | | | |
| 8 | Profits Before Taxes | | | |



| | | | | |
|---|------------------|--|--|--|
| 9 | Return on Equity | | | |
|---|------------------|--|--|--|

Attached are copies of the last three audited balance sheets, including gall related notes, and income statements as indicated above, complying with the following:

- i. All such documents reflecting the financial situation of the Bidder.
- ii. Historic financial statements must be audited by a certified accountant and must be complete, including all notes to the financial statements.
- iii. Historic financial statements must correspond to accounting periods already completed and audited (no statement for partial periods shall be accepted).
- iv. Filling up of all information is mandatory. Not providing any information or not in line with audited reports accompanied shall make Bid liable for rejection.

Appendix 4: Format of Disclosure of PV Technology Proposed

| | | |
|--|---|---|
| Proposed AC Capacity (in MW) | : | 75 MW (AC) near SLPP Plant |
| | | |
| Proposed DC Capacity (in MWp) | : | 75 MW (AC) near SLPP Plant |
| | | |
| PV MODULE | | |
| Type | : | Poly-crystalline Silicon |
| Manufacturer | : | |
| Model Number | : | |
| Module Capacity | : | W |
| No. of Cells per Module | : | |
| No. of Modules | : | |
| PV INVERTER | | |
| Type | : | Central Inverter |
| Configuration in one Block and Number of Blocks/Inverter rooms | : | 75 MW |
| | | |
| Manufacturer | : | |
| Model Number | : | |
| Inverter Capacity at 50 Deg C temperature | : | kW |
| Number of Inverters | : | 75 MW |
| | | |

| | | |
|---|---|---|
| MODULE TRACKING | | |
| Type | : | Select One: <input type="checkbox"/> Fixed <input type="checkbox"/> 1-Axis Manual Seasonal <input type="checkbox"/> Other, Please specify..... |
| Inverter Room Construction Type | | 75 MW |
| | | |
| Main Control Room Contraction type (RCC/ Pre-Fab) | | 75 MW |
| | | |

Appendix5: Format for Project Execution Plan

I. Division of Scope of Work

| Discipline/ Equipment | Basic Engineering | Design/ Detailed Engineering | Procurement | Supply | Project Management | Construction/ Fabrication/ Installation | Commissioning |
|--------------------------|----------------------|------------------------------------|-------------|--------|-----------------------|---|---------------|
| | | | | | | | |
| | | | | | | | |

NOTES:

1. Bidder shall clearly indicate the agency which will carry out each activity and the location of activity.
2. In case any activity is proposed with back-up consultant, Bidder shall clearly indicate role of back-up consultant.
3. Bidder to identify major equipment / items and discipline.

II. DETAILED PROJECT SCHEDULE

| Sr. | Activity | Start Date | End Date |
|-----|--------------|------------|----------|
| 1. | Issue of LoI | Zero Date | |
| 2. | | | |
| 3. | | | |

NOTES:

1. The Bidder shall ensure that the entire work is completed within 300 days of issue of LoI.
2. All Start Dates and End Dates to be indicated with respect to the Zero Date, e.g. +3 Days.
3. The Bidder may use as many lines as required to satisfactorily provide the detailed project schedule.

SIGNATURE OF BIDDER

NAME

DESIGNATION

SEAL DATE

Appendix 6: Bid Evaluation Criteria (BEC) for 75 MW (AC) Solar Project

The Evaluated Bid Value (EBV) shall be calculated using the following parameters:

Parameters Quoted by the Bidder:

- i. Quoted EPC Contract Price,
- ii. Quoted Annual Net Electrical Energy Generation Guarantee (NEEGG) at the metering point of the Plant for each year during the O&M period (of 3years),
- iii. Quoted O&M Contract Price for each year during the O&M period (of 3 years),

Parameters assumed constant for evaluation of each Bidder:

- iv. Discount Factor of 9.36% annually.

The Evaluated Bid Value (EBV) shall be calculated using the abovementioned parameters as follows:

| | | | |
|---------------|--------|---|---|
| Step 1 | | : | Quoted EPC Contract Price at the zero th (0 th) year |
| Step 2 | | : | Net Present Value (NPV) of 3 years of O&M Cost quoted by the Bidder |
| Step 3 | ADD | : | Summation of EPC Contract Price and NPV of O&M for 3 years |
| Step 4 | | : | Summation of quoted NEEGG for 3 years |
| Step 5 | DIVIDE | | (Sum of EPC Contract Price and NPV of each year O&M Contract Price for 3 years) by (Summation of quoted NEEGG for 3 years) i.e. (Step3/Step4) |

The Evaluated Bid Value (EBV) shall be the Net Present Value (NPV) as calculated above.

Evaluated Bid Value (EBV) =

$$\frac{[(\text{EPC Contract Price}) + (\text{NPV of each year O\&M Contract Price of 3 years of})]}{\sum \text{NEEGG of 3 years}}$$

The Bidder with the lowest EBV in Rs. /kWh shall be the Successful Bidder.

EXAMPLE:



The following example will further clarify the methodology of comparison:

Note: Figures quoted by Bidder are in **Box**.

For 75 MW: For option-1 Evacuation of Power up to 66kV Mosali S/s of GETCO

| Figures Quoted by Bidder 1 | | | | | Derived/ Evaluated Figures | |
|----------------------------|---|-----|--------------|---------------|---|---------------|
| EPC Price | : | Rs. | 300 | Crore | | |
| Year | | | NEEGG | O&M Cost | | |
| | | | (in kWh) | (Rs.) | | |
| 0 | | | NA | NA | | |
| 1 | | | 17,73,90,000 | 1,77,00,000 | NPV of each year O&M Contract Price for the Project (in Rs.) | 5,10,09,988/- |
| 2 | | | 17,68,57,830 | 1,85,85,000 | | |
| 3 | | | 17,63,27,257 | 1,95,14,250 | | |
| Total | | | 53,05,75,087 | 5,57,99,250/- | EBV (in Rs/ kWh) | 5.75 |

For 75 MW : For option-1 Evacuation of Power up to 66kV Mosali S/s of GETCO

| Figures Quoted by Bidder 2 | | | | | Derived/ Evaluated Figures | |
|----------------------------|---|-----|--------------|---------------|---|---------------|
| EPC Price | : | Rs. | 290 | Crore | | |
| Year | | | NEEGG | O&M Cost | | |
| | | | (in kWh) | (Rs.) | | |
| 0 | | | NA | NA | | |
| 1 | | | 17,08,20,000 | 1,68,15,000 | NPV of each year O&M Contract Price for the Project (in Rs.) | 4,84,59,489/- |
| 2 | | | 17,03,07,540 | 1,76,55,750 | | |
| 3 | | | 16,97,96,617 | 1,85,38,538 | | |
| Total | | | 51,09,24,157 | 5,30,09,288/- | EBV (in Rs/ kWh) | 5.77 |

Result:

$$\text{EBV of Bidder 1} = [(300,00,00,000 + 5,10,09,988) / 53,05,75,087]$$

= Rs/kWh 5.75

$$\text{EBV of Bidder 2} = [(290,00,00,000 + 4,84,59,489/-) / 51,09,24,157]$$

= Rs/kWh 5.77

- EBV in Rs/kWh of Bidder 1 is Rs. 5.75 kWh.
- EBV in Rs/kWh of Bidder 2 is Rs 5.77 kWh.
- EBV of Bidder 2 is higher than Bidder 1.

Bidder with lower EBV in Rs. /kWh shall be L-1 and Bidder with higher EBV will be L-2.

Hence, in the above Bidder 1 would be preferred as the Successful Bidder (L-1) compared to Bidder 2.

GIPCL shall discover two EBV for Option-1 and Option-2, however based on finalization of evacuation point/metering point the order shall be placed for any of the one EBV.

NOTE: This is only example. EBV calculation methodology is same for 75 MW Project.

There is an e-Reverse Auction after opening of the Financial Bid where the Bidder has to give discount as per the procedure of the e-Reverse Auction.



Appendix 7: Submission of Technical Document

A) Technical Documents to be submitted along with the technical bid (Soft copy as well as Hard copy)

1. Plant single line diagram
2. DC Capacity
3. AC Capacity
4. Inverter Block size Configuration
5. MMS (fixed or Tracking)
6. PV syst Report (As per quoted 1st year NEEGG)

Details of Major Equipments / Items (To be submitted with Bid)

| Sr. No. | Description | Make | Model | Capacity / Rating |
|---------|-----------------------------------|------|-------|-------------------|
| 1. | PV Modules | | | |
| 2. | String Junction Boxes (SJBs) | | | |
| 3. | DC Cables | | | |
| 4. | PCUs / Inverters | | | |
| 5. | Inverter Transformer | | | |
| 6. | AC Cables | | | |
| 7. | HT Panel / Switchgear | | | |
| 8. | LT Panel / Switchgear | | | |
| 9. | Control and Relay Panel | | | |
| 10. | SCADA System | | | |
| 11. | Weather Monitoring System | | | |
| 12. | Power Transformer | | | |
| 13. | 66 KV Switchyard at developer end | | | |

B) Technical Documents to be submitted after award of Contract:

1. Stadd Pro software file soft copy for Civil Foundation and Structure for verification of Civil & Structure design with third party.
2. Plant Layout
3. Control room layout drawing
4. Inverter room layout drawing
5. Civil MMS foundation drawing
6. Cross section drawing of road
7. Cross section drawing of fencing
8. MMS drawing along with weight
9. Detailed schematic drawings of control and protection circuit for Inverter, LT panel etc.



10. Bill of Material shall include item description, type, weight, quantity, make, part / model number, specification etc. for all equipments / items supplied for the project
11. Internal and external General arrangement layout for inverter, etc.
12. Installation manual for all equipments supplied under this RFP
13. Operation and maintenance manual for all equipments supplied under this RFP
14. Earthing drawings for all equipments supplied under this RFP
15. Parameter settings of inverter
16. Technical datasheets, GA Drawings, system design documents/philosophy for all equipments supplied under this RFP
17. List of sub-vendors for all the Bill of Material items related to materials detailed drawings of foundations.
18. MQP, QAP and testing procedure for all equipments supplied under this RFP
19. Detailed activity-time chart for entire project implementation indicating Start Date and End Date for each activity.
20. Any other documents required for project not mentioned above
21. Detailed manpower deployment schedule.

All documents / drawings shall be submitted in PDF as well as editable format like AutoCAD, excel, word etc., as per requirement by GIPCL.

i) PV Module

Documents to be submitted after award of Contract in Soft copy and Hard Copy:

1. As Built GA drawing of PV module indicating detailed dimensions, location of Junction box, DC cable length, details of mounting holes, etc.
2. Datasheets for electrical and mechanical properties indicating all the parameters specified in the detailed Scope of Work.
3. Performance data at STC as well as NOTC.
4. Graphs indicating:
 - a. Efficiency v/s. Temperature at incident irradi. For 200W/m², 400 W/m², 600W/m², 800W/m², 1000W/m².
 - b. Efficiency v/s. Incident radiation at STC condition.
 - c. I-V curves at various temperatures like STC, 6 ° C, 25 ° C, 35 ° C, 46 ° C as well as at various incident radiation for 200W/m², 400 W/m², 600W/m², 800W/m², 1000W/m².
 - d. Temperature Vs Power at incident radiation. For 200W/m², 400 W/m², 600W/m², 800W/m², 1000W/m².
5. IEC certificates and other certificate as applicable.
6. Certificate of PV Cell and PV Cell QC documents from original cell manufacture applicable to PV Modules supplied under this contract.
7. Installation Manual



8. List of Sr. No. / RFID as per details mentioned in tender specification in Scope of Work for PV Modules.
9. Warrantee & Guarantee Certificate
10. O & M Manual
- ii) PCU: Technical Documents to be submitted

The following support documents shall be submitted as part of its Scope of Work:

1. Datasheets for electrical and mechanical properties indicating all the parameters specified in the Scope of Work.
2. Performance data at STC
3. Graphs indicating:
 - a. Efficiency and AC output v/s. temperature
 - b. Efficiency v/s. AC output incident radiation at STC and NOTC
 - c. Efficiency and output curves at various incident radiation
 - d. Pout AC v/s. Pin DC
 - e. Efficiency profile v/s. Input power
4. IEC certificates
5. Compliance certificate as per GETCO/GUVNL/GEDA/MNRE/DISCOM requirements
6. Warranty documents
7. Installation manual
8. SLD of inverter showing switches, breakers, no of inputs, configuration etc.

Further following details to be filled by the Bidder after award of contract:

| A. | Minimum guaranteed performance parameters | Information to be filled in by the Bidder |
|----|---|---|
| 1 | Manufacture | |
| 2 | Make of PV Cell with country of origin | |
| 3 | Model | |
| 4 | Type (Type of Technology) | |
| 5 | Annual manufacturing capacity | |
| 6 | Annual Manufacturing/importing capacity for cell supplier. | |
| 7 | Annual Booked capacity complete | |
| 8 | Annual booked capacity for offered model | |
| 9 | Last year MW sell of the modules of Above offered model | |
| 10 | Quantity of Modules 1. For more than 300 Wp | |
| 11 | Power rating under standard testing conditions(STC) i.e. AM 1.5, 1000 W/m ² OR 1500W/m ² , 25°C of cell temperature | |
| 12 | Power rating under PTC(PVUSA (Photovoltaic Utility scale application)Test condition) | |
| 13 | Tolerance in power rating | |
| 14 | Rated Power per Square meter (watts) | |



| | | |
|-----------|---|--|
| | of module | |
| 15 | Module Efficiency at STC | |
| 16 | Temperature co-efficient of power (%/°C) | |
| 17 | Permitted module temperature under continuous duty | |
| 18 | Module efficiency under irradiance of 200 W/m ² , 25 °C and AM 1.5 | |
| 19 | Power rating at Normal Cell Operating Temperature (°C) | |
| 20 | Series Fuse Rating (amps) | |
| B. | General Electrical Characteristics under STC | |
| 1 | Voc (Open circuit voltage at STC) | |
| 2 | Isc (Short circuit current at STC) | |
| 3 | Vmp (Voltage at maximum power point at STC) | |
| 4 | Imp (Current at maximum power point at STC) | |
| 5 | Individual cell voltage, current ,power & efficiency | |
| 6 | No of Bus bar in module | |
| 7 | Open-Circuit Voltage Temperature Coefficient (mV per degree C) | |
| 8 | Short-Circuit Current Temperature Coefficient (mA per degree C) | |
| 9 | Fill factor(Shall be ≥0.75) | |
| C. | Guaranteed overall design specifications | |
| 1 | General module configuration | |
| 2 | Maximum system voltage | |
| 3 | Maximum reverse current | |
| 4 | Structural strength for sustaining wind/snow load | |
| 5 | Permitted module temperature on continuous duty | |
| 6 | Front glass | |
| 7 | Module frame material | |
| 8 | Weather module frame is anodized? (YES/NO) | |
| 9 | Encapsulants/sealants | |
| D. | Junction box | |
| 1 | No. Of bypass diodes | |
| 2 | Diode ratings | |
| 3 | Moisture trap | |
| 4 | IP Protection | |
| 5 | Voltage drop in diode | |
| E. | Module connecting cable | |
| 1 | Type of conductor | |
| 2 | Size of the conductor | |
| 3 | Electrical ratings | |
| 4 | Environment characteristics | |
| 5 | Length | |
| 6 | Electrical ratings | |
| F. | Cable connector | |
| 1 | Type | |



| | | |
|----------|---|--|
| 2 | Electrical ratings | |
| 3 | Compatibility | |
| 4 | Contact resistance | |
| 5 | IP Protection | |
| G | Physical parameter of module | |
| 1 | Length in mm | |
| 2 | Width in mm | |
| 3 | Depth in mm | |
| 4 | Module area in sq. Meter | |
| 5 | Rough module area in sq. Meter | |
| 6 | Sensitive area (cell) in sq. Meter | |
| 7 | Cell size in mm | |
| 8 | Total number of Cells in module | |
| 9 | Cells in series | |
| 10 | Cells in parallel | |
| 11 | Cells in series per bypass diode | |
| 12 | Weight in Kg | |
| H | Commercial | |
| 1 | Material/product Warranty(years) | |
| 2 | First year degradation(Max % to be quoted) | |
| 3 | Standard degradation per year after first year (%) | |
| 4 | Power warranty (years) | |
| 5 | Insurance if any for modules for complete life time | |



Appendix 8: Details of Qualified Technical Staff

| Sr. No. | Name | Relevant Qualification | Additional Certifications | Total Years of Relevant Experience | Remarks |
|--------------------|-------------|-----------------------------------|--------------------------------------|---|----------------|
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | | | | |

Note:

Kindly submit copies of resumes and appropriate certifications with this sheet.

Additional sheets may be used to provide accurate information.



Appendix 9: Declaration of Compliance

Date:

To,

Shri S. N. Purohit
CHIEF GENERAL MANAGER (RE & BO)
Gujarat Industries Power Company Limited
PO: Ranoli-391350,
Dist.: Vadodara, Gujarat, India

Sub: Declaration of Compliance for the Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat in the state of Gujarat on EPC basis.

Dear Sir,

This is to certify that I, _____,
am the duly authorized signatory appointed on behalf of my organization to submit this Bid.
The authorization letter is attached herewith.

I agree to all the terms and conditions set forth in this RFP Document.

If awarded the job, the job work shall also conform to the terms and conditions, as well as specifications indicated in the RFP documents and as finally indicated by the Evaluation Committee.

I further certify that all the information provided in this document is accurate to the best of my knowledge.

Signature: _____ Designation: _____

Name: _____ Organization: _____

Address: _____ Phone: _____

Email: _____



Appendix 10: No Deviation Certificate

Date:

To,

Shri S. N. Purohit

CHIEF GENERAL MANAGER (RE & BO)

Gujarat Industries Power Company Limited

PO: Ranoli-391350,

Dist.: Vadodara, Gujarat, India

Sub: No Deviation Certificate regarding Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75 MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat, in the state of Gujarat on EPC basis.

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.

SEAL AND SIGNATURE OF BIDDER

Date: _____



Appendix 11: Declaration on Bidder's relation to Directors

Date:

To,

Shri S. N. Purohit

CHIEF GENERAL MANAGER (RE & BO)

Gujarat Industries Power Company Limited

PO: Ranoli-391350, Dist.: Vadodara, Gujarat, India

Sub: Declaration of relationship with Directors/any other employee/associates.

Dear Sir,

This has reference to our proposed Contract regarding Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat, in the state of Gujarat to be entered into Agreement with Gujarat Industries Power Company Limited

For the purpose of Section 297/299 of the Companies Act, 1956 we certify that to the best of my/our knowledge;

- i) I am not a relative of any Director of GIPCL;
- ii) We are not a firm in which a Director of GIPCL or its relative is a partner;
- iii) I am not a partner in a firm in which a Director of GIPCL, or its relative is a partner;
- iv) We are not a private company in which a Director of GIPCL is a member or director;
- v) We are not a company in which Directors of GIPCL hold more than 2% of the paid-up share capital of our company or vice-versa.

Authorised Signatory of the Contracting Party

Place:

Date:



Appendix 12: Format of Power of Attorney as Authorized Signatory

(On a non-judicial stamp paper of appropriate value)

Know all men by these presents, We ... (name of the firm and address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorise Mr. / Ms (Name), son/daughter/wife of and presently residing at, who is presently employed with us and holding the position of, as our true and lawful attorney (hereinafter referred to as the “Attorney”) to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75 MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat, in the state of Gujarat, pursuant to the RFP document no. _____ issued by Gujarat Industries Power Company Limited (“GIPCL”) including but not limited to signing and submission of all applications, Bids and other documents and writings, participate in Bidders’ and other conferences and providing information / responses to the Company, representing us in all matters before the Company, signing and execution of all contracts including the Contract Agreement and undertakings consequent to acceptance of our Bid, and generally dealing with the Company in all matters in connection with or relating to or arising out of our Bid for the said Project and/or upon award thereof to us and/or till the entering into of the Contract Agreement with GIPCL.

AND we hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE,, THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF, 20.....



For.....

(Signature, name, designation and address)

Witnesses:

1.

2.

Accepted Notarised

(Signature, name, designation and address of the Attorney)

Notes:

- 1. The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.*
- 2. Wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders resolution/ power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.*
- 3. For a Power of Attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the Power of Attorney is being issued. However, the Power of Attorney provided by Bidders from countries that have signed the Hague Legislation Convention, 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate.*
- 4. This format for Power of Attorney is for reference and in case a Bidder has a different format approved by their management then the same can submitted.*



Appendix 13: Format of Summary of Audited Financial Statements

To

Shri S. N. Purohit

CHIEF GENERAL MANAGER (RE & BO)

Gujarat Industries Power Company Limited

PO: Ranoli-391350,

Dist.: Vadodara, Gujarat, India

Sub: Summary of Financial Statement

Ref: Request for Proposal for Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75 MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat, in the state of Gujarat on EPC basis.

Dear Sir,

This is to certify that *[Insert name of Bidder]* (The “Bidder”) having its Registered Office at..... *[Insert Registered Address of the Bidder]* with PAN No. *[Insert PAN No. of the Bidder]* is in the business of..... *[Insert briefly the nature of the business]*, has recorded the following turnovers and net worth:

| Financial Year | Turnover (in INR) | Net Worth (in INR) | For Official Use Only |
|----------------|----------------------|-----------------------|-----------------------------|
| | | | Audited Statement Attached? |
| 2020-21 | | | Yes / / No |
| 2019-20 | | | Yes / No |
| 2018-19 | | | Yes / No |

All figures indicated herein are arrived from the Audit Reports of the Bidder duly submitted to the Income Tax Department.



Sincerely yours,

[Official seal of the Chartered Accountant]

.....
[Insert Name of the Chartered Accountant]

Date: [Insert Date]

[Insert address and contact information of the Chartered Accountant]

Place: [Insert Place]

All figures indicated herein are calculated as per the guidelines mentioned in the Tender.

NOTES:

- A. If the Bidder is seeking financial qualification based on the financial standing of the Parent Company, then a similar certificate summarizing the financial statement of the Parent Company shall be attached by the Bidder as a part of the Bid.
- B. All audited statements to be attached by the Bidder as a part of the Bid.



Appendix 14: Format of Authorization by Parent Company

[On the Official Letterhead of the Parent Company]

[Reference No.]

From: [Name of Parent Company]

[Address of Parent Company]

[Date]

To

Shri S. N. Purohit

CHIEF GENERAL MANAGER (RE & BO)

Gujarat Industries Power Company Limited

PO: Ranoli-391350,

Dist.: Vadodara, Gujarat, India

Sub: Authorization of use of financial capability by Parent Company

Ref: Request for Proposal for Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75 MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat , in the state of Gujarat

Dear Sir,

- A. With reference to RFP No....., we confirm that we hold..... [Insert percentage of share held in words] percent ([Insert percentage of share held in figures] %) share in M/s. [Insert Name of the Bidder].
- B. We confirm that M/s. [Insert Name of the Bidder] is authorized by us to use our financial capability for meeting the financial criteria as specified in the Tender, meeting



all the provisions including but not limited to terms and conditions of the Tender and undertaking the Scope of Work as defined in the Tender.

- C. We further confirm that we shall by jointly and severely be held responsible for the performance of M/s. [Insert Name of the Bidder] as per the various provisions including but not limited to the terms and conditions in undertaking the Scope of Work as defined in the Tender.
- D. Our financial summary is attached as a part of the Bid submitted by..... [Insert Name of the Bidder] as per the appropriate format indicated in the Tender.

For and on behalf of..... [Insert Name of Parent Company]

[Signature and Stamp of any Whole-Time Director]

Name: [Insert name of the Whole-Time Director]

Place: [Insert Place]

Date: [Insert Date]

[NOTE:

- A. The Authorization of use of financial capability by Parent Company shall be supported by a specific Board Resolution of the Parent Company satisfactorily conveying the same.]



Appendix 15: Format of Financial Proposal

To

Shri S. N. Purohit

CHIEF GENERAL MANAGER (RE & BO)

Gujarat Industries Power Company Limited

PO: Ranoli-391350,

Dist.: Vadodara, Gujarat, India

Sub: Financial Proposal for Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat , in the state of Gujarat on EPC basis.

Dear Sir,

I, _____,
present the Financial Proposal for the **“Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) near Surat Lignite Power Plant of GIPCL, Dist. Surat , in the state of Gujarat ”** on EPC basis through the Tender Document No. **“Tender No. GIPCL/ Solar/EPC/2022/ 75 MW (AC) Solar”** confirming that:

- i. I agree to all the terms and conditions set forth in this Tender Document. If awarded the Project, the implementation of the Project shall also conform to the terms and conditions, as well as specifications indicated in the Tender Document and as finally indicated by the Evaluation Committee.
- ii. Rates quoted in this Bid is for destination prices inclusive of all taxes, levies, duties, packing, forwarding, freight, insurance, loading, unloading, supply, installation, commissioning, and any/all charges for successful Engineering, Supply & Installation,



Construction, Comprehensive Operation and Maintenance of “Project” at the Site. The break-up of taxes considered are also furnished in price bid.

- iii. Rates quoted in this Bid are inclusive of taxes and duties. The statutory variation in taxes shall be admissible in accordance with the Clause no. 7.13 Taxes and duties of Tender Document. Under no circumstances shall escalation in the prices of this Tender Document shall be entertained.
- iv. The details quoted herein stand valid for at least 120 days from the date of opening of the Price Bid.



SCHEDULE OF PRICE

All Schedules of Prices to be submitted online only

Submission Due Date:

(As per Bid Submission Instruction of RFP)

Table 15A: SCHEDULE OF PRICE –A1- Evacuation up to 66kV GETCO Substation

(BREAK-UP OF PRICE FOR SUPPLY OF EQUIPMENTS-75 MW(AC) Solar Project near Surat Lignite Power Plant of GIPCL)

| Sr. No. | Item | Price for 75 MW (AC) (Without taxes & duties) | Freight & Transportation | Custom Duties (if applicable) | Other Taxes & Duties (if applicable) | GST | Safeguard duty if any | Final Price For 75 MW (AC) SPV Plant |
|------------|---|--|-----------------------------|----------------------------------|--|----------|-----------------------------|---|
| | | (A) | (B) | (C) | (D) | (E) | (F) | (G) = (A+B+C+D+E+F) |
| | | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) |
| 1 | Supply of PV Modules | | | | | | | |
| 2 | Supply of Inverters | | | | | | | |
| 3 | Supply of MMS | | | | | | | |
| 4 | Supply of Civil items | | | | | | | |
| 5 | 66 kV Underground cable/ Overhead Transmission lines from both solar plants to GETCO Substation including all runs of Conductors including all the accessories and erection and commissioning if power is to be evacuated at 66kV Mosali S/s | | | | | | | |



| | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
| 6 | Supply of Balance of System includes all equipment, materials, accessories etc. (excluding Sr.no.1 to 5) | | | | | | | |
| 7 | Total (Rs.) 7= (1+2+3+4+5+6) | | | | | | | |
| 8 | "Supply Price" quoted by the Bidder in Words [in Words as per column (7G)] | | | | | | | |



**Table 15A: SCHEDULE OF PRICE –A2- Evacuation up to 220kV switchyard of Surat Lignite Power Plant of GIPCL
(BREAK-UP OF PRICE FOR SUPPLY OF EQUIPMENTS-75 MW(AC) Solar Project near Surat Lignite Power Plant of GIPCL)**

| Sr. No. | Item | Price for 75 MW (AC) (Without taxes & duties) | Freight & Transportation | Custom Duties (if applicable) | Other Taxes & Duties (if applicable) | GST | Safeguard duty if any | Final Price For 75 MW (AC) SPV Plant |
|---------|---|--|--------------------------|----------------------------------|---|----------|-----------------------|---|
| | | (A) | (B) | (C) | (D) | (E) | (F) | (G) = (A+B+C+D+E+F) |
| | | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) |
| 1 | Supply of PV Modules | | | | | | | |
| 2 | Supply of Inverters | | | | | | | |
| 3 | Supply of MMS | | | | | | | |
| 4 | Supply of Civil items | | | | | | | |
| 5 | 33 kV Underground cable/ Overhead Transmission lines from both solar plants to 220kV Switchyard of Surat Lignite Power Plant including all runs of conductors including all the accessories and erection and commissioning if power is to evacuated at 220kV. | | | | | | | |



| | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
| 6 | Supply of Balance of System includes all equipment, materials, accessories etc. (excluding Sr.no.1 to 5) | | | | | | | |
| 7 | Total (Rs.) 7= (1+2+3+4+5+6) | | | | | | | |
| 8 | "Supply Price" quoted by the Bidder in Words [in Words as per column (7G)] | | | | | | | |

Note:

- At the time of award of contract, GIPCL will select any one of the Evacuation Point for evacuation of Power (220kV Switchyard of Surat Lignite Power plant or 66kV GETCO substation at Mosali). The contract value shall only be considered any one option for evacuation of Power and revised price after e-reverse auction.

Payment of Safeguard duty and Basic Custom Duty:

- GIPCL shall reimburse Safeguard duty and Basic Custom Duty (BCD) on actual basis / as per the sealing limit given in the price break up / as mentioned by the bidder on price schedule whichever is lower, based on supporting documents/payment receipt etc. If it is not mentioned in Colum (C) and/or (F), it will be considered as zero
- Bidder is requested to consider the Basic custom duty as per MNRE OM dtd; 09.03.2021 and price shall be inclusive of BCD.**



**Table 15A: SCHEDULE OF PRICE –B1- Evacuation up to 66kV GETCO Substation
(BREAK-UP OF COST FOR CONSTRUCTION, ERECTION, TESTING, COMMISSIONING & COD with GEDA/GUVNL- 75
MW(AC) Solar Project near Surat Lignite Power Plant of GIPCL)**

| Sr. No. | Item | Price for 75 MW (AC) (without taxes & duties) | GST | Other taxes & duties (if any) | Final Price For 75 MW (AC) SPV Plant |
|---------|--|---|----------|----------------------------------|--|
| | | (A) | (B) | (C) | (D)=(A+B+C) |
| | | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) |
| 1 | General works including construction, erection, testing, commissioning, COD with GEDA/GUVNL etc. of entire plant as per details specified in the Tender documents, on EPC Basis. | | | | |
| 2 | “Works Price” quoted by the Bidder: (in Words) (=TOTAL Final Price as per Column (1D)) | | | | |



Table 15A: SCHEDULE OF PRICE –B2- Evacuation up to 220kV switchyard of Surat Lignite Power Plant of GIPCL (BREAK-UP OF COST FOR CONSTRUCTION, ERECTION, TESTING, COMMISSIONING & COD with GEDA/GUVNL- 75 MW (AC) Solar Project near Surat Lignite Power Plant of GIPCL)

| Sr. No. | Item | Price for 75 MW (AC) (without taxes & duties) | GST | Other taxes & duties (if any) | Final Price For 75 MW (AC) SPV Plant |
|---------|--|---|----------|----------------------------------|--|
| | | (A) | (B) | (C) | (D)=(A+B+C) |
| | | (In Rs.) | (In Rs.) | (In Rs.) | (In Rs.) |
| 1 | General works including construction, erection, testing, commissioning, COD with GEDA/GUVNL etc. of entire plant as per details specified in the Tender documents, on EPC Basis. | | | | |
| 2 | “Works Price” quoted by the Bidder: (in Words) (=TOTAL Final Price as per Column (1D)) | | | | |

Note:

1. EPC cost with taxes and duties shall be considered for evaluation of bid. Thereafter e-Reverse Auction shall be done.
2. No variation due to change in forex rate shall be admissible.
3. Payment shall be made in Indian National Rupees (INR) only. Bidder(s) has to quote their rate in INR only.
4. Arithmetical errors will be rectified on the following basis: If there is a discrepancy between words and figures, the amount written in words will prevail.

Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) Near Surat Lignite Power Plant of GIPCL, Dist. Surat, Gujarat



Table 15B1: Price Quote for O&M Contract (Evacuation up to 66kV GETCO Substation)

(BREAK-UP OF COST FOR O & M AND NEEGG FOR 75 MW (AC))

| Sr. No. | Head | Annual Rate for Comprehensive O&M (each year "O&M Contract Price") (A) | Taxes & Duties (B) | O&M charges including taxes (C=A+B) | NEEGG (D) | Discounting factor for NPV @9.36 % (E) | NPV of O&M charges (F=CxE) |
|---------|--|--|--------------------|-------------------------------------|-----------|--|----------------------------|
| | | (In Rs.) | (In Rs.) | (In Rs.) | (In kWh) | | (In Rs.) |
| 1 | O & M for First Year. | | | | | 1 | |
| 2 | O & M for Second Year. | | | | | 0.9144 | |
| 3 | O & M for Third Year. | | | | | 0.8361 | |
| 4 | TOTAL (In Figures) | | | | | | |
| 5 | TOTAL Rate for Comprehensive O&M including all taxes " Total O&M Contract Price" (In Words) –(As per Column 4 C) | | | | | | |
| 6 | TOTAL NEEGG (In Words) – (As per Column 4D) | | | | | | |

Table 15B2: Price Quote for O&M Contract (Evacuation up to 220kV switchyard of Surat Lignite Power Plant of GIPCL)

(BREAK-UP OF COST FOR O & M AND NEEGG FOR 75 MW (AC))

| Sr. No. | Head | Annual Rate for Comprehensive O&M (each year "O&M Contract Price") (A) | Taxes & Duties (B) | O&M charges including taxes (C=A+B) | NEEG G (D) | Discount ing factor for NPV @ 9.36 % (E) | NPV of O&M charges (F=CxE) |
|---------|---|--|--------------------|-------------------------------------|------------|--|----------------------------|
| | | (In Rs.) | (In Rs.) | (In Rs.) | (In kWh) | | (In Rs.) |
| 1 | O & M for First Year. | | | | | 1 | |
| 2 | O & M for Second Year. | | | | | 0.9144 | |
| 3 | O & M for Third Year. | | | | | 0.8361 | |
| 4 | TOTAL (In Figures) | | | | | | |
| 5 | TOTAL Rate for Comprehensive O&M including all taxes " Total O&M Contract Price" (In Words) –(As per Column 4C) | | | | | | |
| 6 | TOTAL NEEGG (In Words) – (As per Column 4D) | | | | | | |

All applicable taxes including service tax/GST and any surcharge or cess thereon are included in the quoted number.

Signature: _____ Designation: _____

Name: _____

Address: _____

_____ Seal of Company / Organization:

_____ Phone: _____

Email: _____

Note:

1. Annual O&M price of each year shall not be less than 0.6% of total EPC Cost (without taxes).
2. The Rate for Comprehensive O&M including all taxes for subsequent year shall not be more than 5% of the previous year. E.g. The Rate for Comprehensive O&M including all taxes of 3rd Year shall not be more than 5% of the 2nd Year.
3. O&M Contract after 3rd year shall be mutually decided by the Contractor and GIPCL.

Appendix 16: Procedure for Performance Testing

Part A: Solar PV power plant Net power generation

1. The Contractor shall quote the 'Net Electrical Energy Generation Guarantee' for annual basis considering the Reference Global Average Radiation indicated in this Tender.
2. The Contractor shall demonstrate "Actual Delivered Energy" at metering point (GETCO end sub-station or at 220kV Switchyard of Surat Lignite Power Plant of GIPCL) as compared to the 'Base NEEGG' for every year from the date of starting of O&M Period.
3. The quoted NEEGG as in Table no. 15 B in Appendix 15 for any year shall be permitted with maximum 1 % degradation factor in previous year generation.
4. The quoted NEEGG will be used for the calculating CUF.
5. The Bidder shall clearly mention the technology used i.e. fixed/tilt or seasonal tracker (please specify) as per Table given in Appendix 4.

Part B: Operational Acceptance Test Procedure

Performance Ratio (PR) - Test Procedure

1. Performance Ratio as determined through the PR Test Procedure specified here should not be less than 0.75 for Operational Acceptance Test.
2. The Performance Ratio Test to prove the guaranteed performance parameters of the power plant shall be conducted at site by the Contractor in presence of the Owner. The Contractor's Engineer shall make the plant ready to conduct such tests. The Operational Acceptance Test shall be commenced, within a period of one (1) month after successful Commissioning and, there will be continuous monitoring of the performance for 30 days. Any extension of time beyond the above one (1) month shall be mutually agreed upon. These tests shall be binding on both the parties to the Contract to determine compliance of the equipment with the guaranteed performance parameters. This monitoring will be performed on the site under the supervision of the Owner/ Owner's engineer.
3. The test will consist of guaranteeing the correct operation of the plant over 30 days, by the way of the efficiency rate (performance ratio) based on the reading of the energy produced and delivered to the grid and the average incident solar radiation. During this period of 30 days, any 5 (five) instances of 15 (fifteen) minutes shall be taken to calculate the

instantaneous Performance Ratio of 15 minutes block as per the formula given below in Point No. 5. If the PR of these five instances is above 75%, then Operational Acceptance Test (OAT) shall be considered successful.

4. PR shall be demonstrated against the installed DC Capacity.
5. The Efficiency or performance ratio (PR) of the PV Plant is calculated as follows (according to IEC 61724)

$$\text{Performance Ratio (PR)} = Y_A / Y_R$$

Where;

Y_A = Final (actual measured) PV system yield in kilo-watt hours at the point of measurement during the testing period, and

Y_R = Reference yield calculated as the product of the insolation on the plane of the collector (i.e. PV modules) in kWh/ m² during the testing period and the installed DC capacity of the plant in kW.

= [Insolation on the plane of the collector (i.e. PV modules) in kWh/ m² during the testing period] x Installed DC Capacity

= (kWh/m²) x Installed DC Capacity

Monitoring System for PR Verification

The following instrumentation will be used to determine the Solar Plant Performance:

- Power Meter at the delivery point.
- Power Meter for each inverter for reference only.
- One nos. calibrated pyranometer to determine irradiance on the plane of array (with a target measurement uncertainty of ± 2).
- One nos. calibrated pyranometer to determine irradiance on horizontal plane (with a target measurement uncertainty of ± 2)
- Two nos. thermocouples to measure module temperature with a measurement uncertainty of ± 1 °C.

- Shielded ventilated thermocouple with a measurement accuracy of $\pm 1^{\circ}\text{C}$.
- An anemometer mounted on a 10m mast to measure wind speed (without additional shadowing on modules).
- Data measurement shall be witnessed in the format mutually agreed before the start of PR test by the employer and the contractor jointly for the said period.
- The Contractor shall show the specified PR for Operational Acceptance.

Part C: The procedure for Performance Guarantee Test (PGT) - cum- Final

Acceptance Test- shall be as follows:

1. A weather station with a calibrated pyranometer shall be installed by the Contractor at the location mutually agreed by the Contractor and GIPCL. The test report for the calibration shall be submitted by the Contractor for approval by GIPCL. The calibration should be traceable to a national/international laboratory. The output of this pyranometer for shall be logged in the SCADA system.
2. In case the pyranometer is found to be working erratically then immediately the Contractor shall take necessary steps to rectify and/or recalibrate the instrument to the satisfaction of GIPCL. However, for the dispute period for which such error has occurred and until the instrument is recalibrated to the satisfaction of GIPCL, data from any one of the following list of sources as decided by GIPCL will be used:
 - i. A separate pyranometer installed by the Owner near the site, if available
 - ii. Average of two closest solar power projects, as identified by GIPCL
 - iii. Nearest MNRE weather station
3. “Actual Delivered Energy” from the plant supplied by the Contractor shall be noted for every month and summed up for entire year. For this purpose, the net delivered energy at the metering point shall be taken into account.
4. The measured value of energy at step (3) shall be compared with ‘Base NEEGG’ and hence with ‘Base CUF’ value. “Base NEEGG/ CUF” for a month is calculated by using the NEEGG quoted in the offer by the Contractor adjusted with a correction factor to take into account the actual average global solar radiation measured by the calibrated pyranometer for that year.

5. Further, if the plant is not able to achieve the calculated *Base NEEGG/CUF* during PGT and O&M period and there is a shortfall in energy generation, then the Contractor shall be penalized as per relevant Clause of the Tender.
6. The Contractor shall share with GIPCL all the radiation, generation, etc. parameters details and all other factors necessary for GIPCL to corroborate the estimate. GIPCL has the right to cross verify data submitted by the Contractor by all possible means/sources.

Following factors may be noted for computing the Base NEEGG/ CUF and PR Test:

7. Effect due to variation in annual insolation shall only be considered for computing the Base NEEGG/ CUF.
8. Effect due to variation of meteorological parameters e.g. ambient temperature, wind speed, humidity etc. shall not be considered.
9. **Generation loss due to grid outage (or power evacuation system which is not in the scope of the Contractor):** The measured global solar radiation of the period of the outage of the power evacuation system shall be excluded to calculate average global solar radiation for the period of PGT and O&M.
10. In case, the GHI is not available because of instrumentation or SCADA problem, the corresponding insolation and generation shall be excluded from the time block for estimation of loss of generation and PG Test shall be extended for the same outage period.

Solar Radiation:

Ideally, actual measurement of solar radiation at the site is desirable for estimating the projected power output since solar energy is the raw material for power generation. It may be noted that the annual average solar radiation measurement even for 1-2 years is not sufficient. World over, an average radiation value for at least 8-10 years is used for solar power project designing since climatic variations are quite wide year-to-year. Under such a situation, the prevailing practice world over is to develop software which uses satellite measured solar radiation and matches it with the actual ground measured data for the particular site where actual data has been obtained for many years. There are radiation data from reputed agencies like NASA available. The derived values are tabulated below:

Solar Radiation for 75 MW Project near Surat Lignite Power Plant of GIPCL

| Month | GHI |
|---------------|---------------------------------|
| | GHI (kWh/m ² /month) |
| January | 140.5 |
| February | 149.7 |
| March | 197.1 |
| April | 200.8 |
| May | 208.6 |
| June | 156.7 |
| July | 116.0 |
| August | 115.4 |
| September | 141.4 |
| October | 155.3 |
| November | 134.5 |
| December | 124.5 |
| Annual | 1840.5 |

Meteonorm Data

The above radiation data shall be used by the Bidder to calculate NEEGG. This radiation data is for evaluation purpose. However, for every year actual radiation shall be considered to calculate the NEEGG by the Bidder.

Illustration:

(B) For 75 MW (AC) Solar Project

If the GHI of a year is more or less then the reference GHI then NEEGG will be calculated as follows:

$$\text{NEEGG} = (\text{Actual GHI} \times \text{NEEGG guaranteed by contractor on reference GHI}) / (\text{Reference GHI})$$

$$\text{NEEGG guaranteed by Contractor} = 17,08,20,000 \text{ KWh}$$

$$\text{Reference GHI} = 1840.5 \text{ KWh/m}^2 \text{ per annum}$$

For Example:

Case A) for higher irradiation:

If Actual GHI = 1932.5 kWh/m² per annum then NEEGG will be:

$$\text{NEEGG} = (1932.5 \times 17,08,20,000) / 1840.5$$

$$\text{NEEGG} = 17,93,61,000 \text{ KWh/ Annum}$$

Case B) for lower irradiation:

If Actual GHI = 1803.69 kWh/m² per annum then NEEGG will be:

$$\text{NEEGG} = (1803.69 \times 17,08,20,000) / 1840.5$$

$$\text{NEEGG} = 16,74,03,600 \text{ KWh/ Annum}$$

Case-C: Higher generation beyond 105% of GHI

If Actual GHI = 1935kWh/m² per annum then NEEGG will be:

$$\text{NEEGG} = (1935 \times 17,08,20,000) / 1840.5$$

$$\text{NEEGG} = 17,9,590,709 \text{ KWh/ Annum}$$

Actual Achieved NEEGG is 17, 93,61,000 KWh/ Annum, There is no penalty applied for under generation.

If Actual Achived NEEGG is 17, 93,62,000 KWh/ Annum, then there is no incentive payable.

Case-D: Incentive

If Actual GHI = 1870 Kwh/m² per annum then NEEGG will be

$$\text{NEEGG} = (1870 \times 17,08,20,000) / 1840.5$$

$$\text{NEEGG} = 17,35,57,946$$

If actual NEEGG is 17,35,58,946, then incentive is payable;

Appendix 17: List of Banks (for Bank Guarantee)

Bank Guarantee from the following Banks will be acceptable for GIPCL

- The Bank Guarantee submitted should have the clear one time validity in all respect and up to the completion period. If by any reason the Contract Period is extended, the Bidder shall undertake to renew the Bank Guarantee at least one month before the expiry of the validity failing which GIPCL will be at liberty to encash the same.

Bank Guarantee from the following Banks will be acceptable for GIPCL

| Sr.No | List of Banks | |
|-------|--|---|
| (1) | All Nationalized Banks including the Public Sector Bank-IDBI Ltd. | |
| (2) | Private Sector Banks (AXIS Bank , ICICI Bank and HDFC Bank) | |
| (3) | Banks | |
| | 1 | Kotak Mahindra Bank |
| | 2 | YES Bank |
| | 3 | Indus land Bank |
| | 4 | RBL Bank (The Ratnakar Bank Ltd.) |
| | 5 | Karur Vysya Bank |
| | 6 | DCB Bank |
| | 7 | FEDERAL Bank |
| | 8 | Dena Gujarat Gramin Bank |
| | 9 | The Kalupur Commercial Co-operative Bank Ltd. |
| | 10 | Rajkot Nagarik Shakari Bank Ltd. |
| | 11 | The Ahmedabad Mercantile Co-operative Bank Ltd. |
| | 12 | The Mehsana Urban Co-operative Bank Ltd. |
| | 13 | Nutan Nagrik Sahakari Bank Ltd. |
| | 14 | Saurashtra Gramin Bank |
| | 15 | Baroda Gujarat Gramin Bank |

- The Bank Guarantee submitted should have the clear one time validity in all respect and up to the completion period. If by any reason the Contract Period is extended, the Bidder shall undertake to renew the Bank Guarantee at least one month before the expiry of the validity failing which GIPCL will be at liberty to encash the same.

Appendix18 (a): Format of Bank Guarantee for EMD

(To be executed on non-judicial stamped paper of appropriate value)

B.G. No. _____

Date: _____

1. WHEREAS M/s. Gujarat Industries Power Company Limited having its Corporate Office at Post: Ranoli, Dist. Vadodara – 391 350, Gujarat State, India (hereinafter called “The Company Owner” which expression shall unless repugnant to the subject or context includes its legal representatives, successors and assigns) has issued tender paper vide its Tender No.....for ----- (hereinafter called “the said tender”) to M/s.(hereinafter called the said Tenderer(s)” which expression shall unless repugnant to the subject or context includes their legal representatives, successors and assigns and as per terms and conditions of the said tender, the tenderer shall submit a Bank guarantee for Rs..... (Rupeesonly) towards earnest money in lieu of cash.
2. WeBank having its branch office at do hereby undertake to pay the amount due and payable under this guarantee without any demur, merely on a demand from the Company stating that in the opinion of the company which is final and binding, the amount claimed is due because of any withdrawal of the tender or any material alteration to the tender after the opening of the tender by way of any loss or damage caused to or would be caused or suffered by the Company by reason of any breach by the said tenderer(s) of any of the terms and conditions contained in the said tender or failure to accept the letter of Intent Agreement or that the amount covered under this Guarantee is forfeited. Any such demand made on the Bank by the owner shall be conclusive as regards the amount due and payable by the Bank under this guarantee, However, our liability under this guarantee shall be restricted to an amount not exceeding Rs.....(Rupees.....only).
3. We undertake to pay to the Company any money so demanded notwithstanding any dispute or disputes raised by the tenderer (s) in any suit or proceeding pending before any office, court or tribunal relating thereto our liability under this present guarantee being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment there under. Our liability to pay is not dependent or conditional on the owner proceeding against the tenderer.
4. The guarantee herein contained shall not be determined or affected or suspended by the liquidation or winding up, dissolution or change of constitution or

insolvency of the said tenderer(s) but shall in all respect and for all purposes be binding and operative until payment of all money due or liabilities under the said contract(s)/ Order(s) are fulfilled.

5. WeBank Ltd. further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the finalization of the said tender and that it shall continue to be enforceable till the said tender is finally decided and order placed on the successful tenderer(s) and or till all the dues of the company under or by virtue of the said tender have been fully paid and its claims satisfied or discharged or till a duly authorized officer of the company certifies that the terms and conditions of the said tender have been fully and properly carried out by the said tenderer (s) and accordingly discharges the guarantee.
6. That the Owner Company will have full liberty without reference to us and without affecting this guarantee to postpone for any time or from time to time the exercise of any of the power of the owner under the tender.
7. Notwithstanding anything contained herein before, our liability shall not exceed Rs..... (Rupees.....only) and shall remain in force till..... (Date to be filled up shall be 120 days from the date of submission of Bid).

Date.....

.....
Bank Corporate Seal of the
Bank By its constitutional
Attorney

Signature of duly Authorized
person
On behalf of the Bank
With Seal & Signature code

Note: BGs to be furnished from any of the banks listed at Appendix 17.

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 Nationalized/Scheduled bank as per Appendix 17 only.
3. This bank guarantee/ all further communication relating to the bank guarantee should be forwarded to Gujarat Industries Power Company Limited, PO:Ranoli-391350, Dist.: Vadodara, Gujarat only.
4. The full address along with the Telex/Fax No. and email address of the issuing bank to be mentioned.

Appendix 18 (b): Format of Bank Guarantee for Security Deposit/ Performance Bank Guarantee

(To be executed on non-judicial stamped paper of approximate value)

BG No.

Date:

1. WHEREAS Gujarat Industries Power Company Limited having its office at Post: Ranoli, Dist. Vadodara – 391 350, Gujarat State, India (hereinafter referred to as “The Company/Owner” which expressions shall unless repugnant to the subject or context includes its legal representatives, successors and assigns) has entered into a contract with M/s...../ has placed a purchase order on M/s.....(hereinafter referred to as “Contractor(s)/ Seller(s)” which expression shall unless repugnant to the subject or context includes their legal representatives, successors and assigns) foron the terms and conditions as set out inter alia, in the Company’s contract No./ P.O. No.....dateand various documents forming part thereof hereinafter referred to as the “said contract” which expression include all amendments, modifications and/ or variations thereto and where as the Contractor(s)/ Seller(s) has agreed for due execution of the entire contract and guarantees its performance including any parts executed through any other agencies/ subcontractors

AND WHEREAS one of the conditions of the “said contract” is that “contractor(s)/seller(s) shall furnish to the owner a Bank Guarantee from a bank for% (.....percent) of the total value of the “said contract” against due and faithful performance of the “said contract” including performance guarantee obligations of the contractor(s)/seller(s) for execution/ supplies made under the “said contract.”

2. We Bank having its branch office atdo hereby agree and undertake to pay the amount due and payable under this guarantee without any demur merely on a demand from the Company stating that in the opinion of the Company, which is final & binding, the amount claimed is due by reason of default made by the Contractor(s)/ Seller(s) in performing any of the terms & conditions of the said Contract including defect liability obligations, in fulfilling the performance guarantee obligation or loss or damage caused to or would be caused to or suffered by the Company by reason of any breach by the said Contractor (s)/ Seller(s) of any of the terms & conditions of the contract. Any such demand made on the Bank by the owner shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However our liability under this guarantee shall be restricted to Rs. (Rupees.....only).

3. We undertake to pay to the Company any money so demanded notwithstanding any dispute or disputes raised by the contractor(s)/ Seller(s) in any suit or proceeding pending before any office, court or tribunal relating thereto our liability under this present guarantee being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment there under. Our liability to pay is not dependent or conditional on the owner proceeding against the Contractor(s)/ Seller(s).
4. The guarantee herein contained shall not be determined or affected or suspended by the liquidation or winding up, dissolution or change of constitution or insolvency of the said Contractor(s)/ Seller(s) but shall in all respect and for all purposes be binding and operative until payment of all money due or liabilities under the said contract(s)/ Order(s) are fulfilled.
5. This guarantee will remain valid up _____ days or _____ whichever is earlier. The Bank undertakes not to revoke this guarantee during its currency without previous consent of the OWNER/PURCHASER and further agrees that if this guarantee is extended for a period as mutually agreed between bidder & owner/purchaser, the guarantee shall be valid for a period so extended provided that a written request for such extension is received before the expiry of validity of guarantee.
6. WeBank further agree with the Company that the company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract(s)/ Order(s) or to extend the time of performance by the said Contractor(s) Seller(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the said Contractor(s)/ Seller(s) and to forbear or enforce any of the terms and conditions relating to the said Contract(s)/ Order(s) and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor (s) / Seller(s) or for any forbearance, act or omission on the part of the Company or any indulgence by the Company to the said Contractor(s)/ Seller(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have affect of so relieving us.
7. Notwithstanding anything contained herein before, our liability shall not exceed Rs.....(Rupees.....only) and shall remain in force till.....Unless a demand or claim under this Guarantee is made on us within three months from the date of expiry we shall be discharged from all the liabilities under this guarantee.

Date.....

Corporate Seal of the Bank

.....Bank

By its constitutional Attorney

Signature of duly Authorized
person

On behalf of the Bank

With Seal & Signature code

INSTRUCTIONS FOR FURNISHING PERFORMANCE BANK GUARANTEE

- 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.
- The Bank Guarantee by Bidder will be given from bank as per Appendix 17 only.
- This Bank Guarantee/ all further communication relating to the bank guarantee should be forwarded to Gujarat Industries Power Company Limited, PO:Ranoli-391350, Dist.: Vadodara, Gujarat only
- The full address along with the Telex/Fax No. and email address of the issuing bank to be mentioned.

Appendix18 (c): Format of Bank Guarantee for Performance for 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:

Gujarat Industries Power Company Limited

PO:Ranoli-391350,

Dist.: Vadodara, Gujarat, India

Dear Sir,

WHEREAS *[Insert name of the Contractor]* with address *[Insert address of the Contractor]* having its registered office at *[Insert address of the Contractor]* (hereinafter, the “Bidder”) wishes to participate in RFP document No. **GIPCL/Solar/EPC/2022/75 MW (AC) Solar dated 21st Jan, 2022** issued by Gujarat Industries Power Company Limited (“GIPCL”) (hereinafter, the “Beneficiary”) for Operation and Management of Performance of Solar Power Project.

And WHEREAS a Bank Guarantee for Rupees *[.....]* valid till *[Insert date for 3 years from the date of commissioning]* is required to be submitted by the Contractor as per the terms and conditions of the RFP.

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.

We [Insert name of the Bank] also agree that withdrawal of the Bid or part thereof by the Bidder within its validity or non-submission of further O&M Performance Bank Guarantee by the Bidder within the stipulated time of the Letter of Intent to the Bidder or any violation to the relevant terms stipulated in the RFP would constitute a default on the part of the Bidder and that this Bank Guarantee is liable to be invoked and encashed within its validity by the Beneficiary in case of any occurrence of a default on the part of the Bidder and that the encashed amount is liable to be forfeited by the Beneficiary.

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 (Insert the Amount). 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:

..... [Signature] (Notary Public)

Place:

Date:

INSTRUCTIONS FOR FURNISHING BANK GUARANTEE

- 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.
- The Bank Guarantee by the Bidder shall be given from bank only given in Appendix 17.
- This Bank Guarantee/ all further communication relating to the bank guarantee should be forwarded to Gujarat Industries Power Company Limited, PO:Ranoli-391350, Dist.: Vadodara, Gujarat /
- The full address along with the Telex/Fax No. and email address of the issuing bank to be mentioned.

Appendix 19: Contract Agreement (to be entered separately with GIPCL for their respective projects)

This agreement is made at VADODARA the -----day of -----in the Christian year Two thousand ----- between -----(herein after referred to as “THE CONTRACTOR” which expression shall unless excluded by or repugnant to the contract include its successors or permitted assigns) of the one part and the Gujarat Industries Power Company Ltd. Having their Head Office at PO: Ranoli-391350, Dist.: Vadodara, Gujarat (hereinafter called “The GIPCL” which expression shall unless excluded by or repugnant to the context include its successors or assigns) of the other part.

WHEREAS the aforesaid GIPCL has accepted the Tender of the aforesaid contractors for ----- as per GIPCL’s Order No.-----hereinafter called “**the Works**” and more particularly described enumerated or referred to in the specification, terms and conditions prescribed in the Order letter, covering letter and other letters and schedule of price which for the purpose of identification have been signed by Shri ----- on behalf of the Contractors and by -----on behalf of the GIPCL a list whereof is made out in the Schedule hereunder written and all of which said documents are deemed to form part of this contract and included in the expression “**the Works**” wherever herein used, upon the terms and subject to the conditions hereinafter mentioned.

AND WHEREAS THE GIPCL has accepted the Tender of the contractors for the construction of the said works for the sum of Rs.------(Rupees :-----) upon the terms and subject to the conditions herein mentioned.

NOW THIS AGREEMENT WITNESSES AND IT IS HEREBY AGREED AND DECLARED THAT:

- (a) The contractors shall do and perform all works and things in this contract mentioned and described or which are implied therein or therefrom respectively or are reasonably necessary for the completion of the works as mentioned and at the times, in the manner and subject to the terms, conditions and stipulations contained in this contract, and in consideration of the due provision, executions, construction and completion of the works agreed to by the

contractors as aforesaid, the GIPCL doth hereby covenant with the contractor to pay all the sums of money as and when they become due and payable to the contractors under the provisions of the contract. Such payments to be made at such times and in such manner as is provided by the contract.

- (b) The conditions and covenants stipulated herein before in this contract are subject to and without prejudice to the rights of the GIPCL to enforce penalty for delays and / or any other rights whatsoever including the right to reject and cancel on default or breach by the contractors of the conditions and the covenants as stipulated in the general conditions, specifications, forms, or Tender schedule, drawing, etc., attached with GIPCL's Order No.-----.

The contract value, extent of supply delivery dates, specifications, and other relevant matters may be altered by mutual agreement and if so altered shall not be deemed or construed to mean or apply to affect or alter other terms and conditions of the contract and the general conditions and the contract so altered or revised shall be and shall always be deemed to have been subject to and without prejudice to said stipulation.

SCHEDULE

List of documents forming part of the contract:

- 1.
- 2.
- 3
- 4.
- 5.
- 6
- 7.
- 8.

In witness whereof the parties hereto have set their hands and seals this day and month year first above written.

4. Signed, Sealed and delivered by:

(Signature with Name, Designation & official seal)

Bid for Design, Engineering, Supply & Procurement, Construction, Erection, Testing, Commissioning, Operation and Maintenance of Solar Photovoltaic Grid-Connected Power Plant of 75MW (AC) Near Surat Lignite Power Plant of GIPCL, Dist. Surat, Gujarat



For and on behalf of M/s. _____

In the presence of name, Full Address & Signatures. :

i).

ii).

5. Signed, Sealed and Delivered by:

(Signature with Name, Designation & official seal)

For and on behalf of Gujarat Industries Power Company Ltd.,
PO:Ranoli-391350, Dist: Vadodara, Gujarat

In the presence of Name, Full Address & Signature:

i)

Appendix 20: Format for Pre-Bid Queries

| Sr. | Chapter No. | Clause No. | Page No. | Tender Term | Bidder's Query |
|-----|-------------|------------|----------|-------------|----------------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Appendix 21: Format for Undertaking

Bidders Name: _____

| Sr No. | Name of- Customer / Project Owner | Capacity of Project in MW (AC) | Scheduled Completion period for Commissioning as per Contract in (Months) | Actual Completion period taken for Commissioning in (Months) | Guaranteed CUF | Cumulative Actual CUF till date. |
|--------|-----------------------------------|--------------------------------|---|---|----------------|----------------------------------|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |

Remarks:

- Bidders shall provide data of at least 6 largest Solar PV Project successfully completed and operational.
- Bidders shall submit supporting documents like copy of LOI/WO/Commissioning certificates etc in support of schedule completion period and actual completion period.

Undertaking:

We hereby give undertaking that above data and information provided is true in all respect and can be verified independently by GIPCL directly from the customers. Further we provide undertaking that no project of 30 MWp and above is delayed beyond 4 months from scheduled date of Commissioning.

Date: _____

Place: _____

(Authorized Signatory with seal)

Annexure-A1: Details of Site

Site Location:

The proposed solar plant is near Surat Lignite Power Plant of GIPCL in the District Surat.

Geographical Location of the site

The geographical location details & measurement details of the sites and are tabulated below:
Parameter Location Site Location: Near Surat Lignite Power Plant of GIPCL near Village: Nani Naroli, Dist: Surat

Latitude: 21°23'20.03"N Longitude: 73° 4'50.74"E (Approx 99 Ha. Land)

Latitude: 21°25'42.90"N Longitude: 73° 6'47.21"E (Approx 47 Ha. Land)

Road Connectivity

The site is best approached from State Highway (SH) 165/168 which connects the site to the National Highway (NH) 48. National Highway (NH) 48 which connects the site to Surat around 54 Km and Vadodara is around 132 km. nearest national expressway to the project site is National Expressway-1, From Ahmedabad to Vadodara which is 143 km away in the north direction.

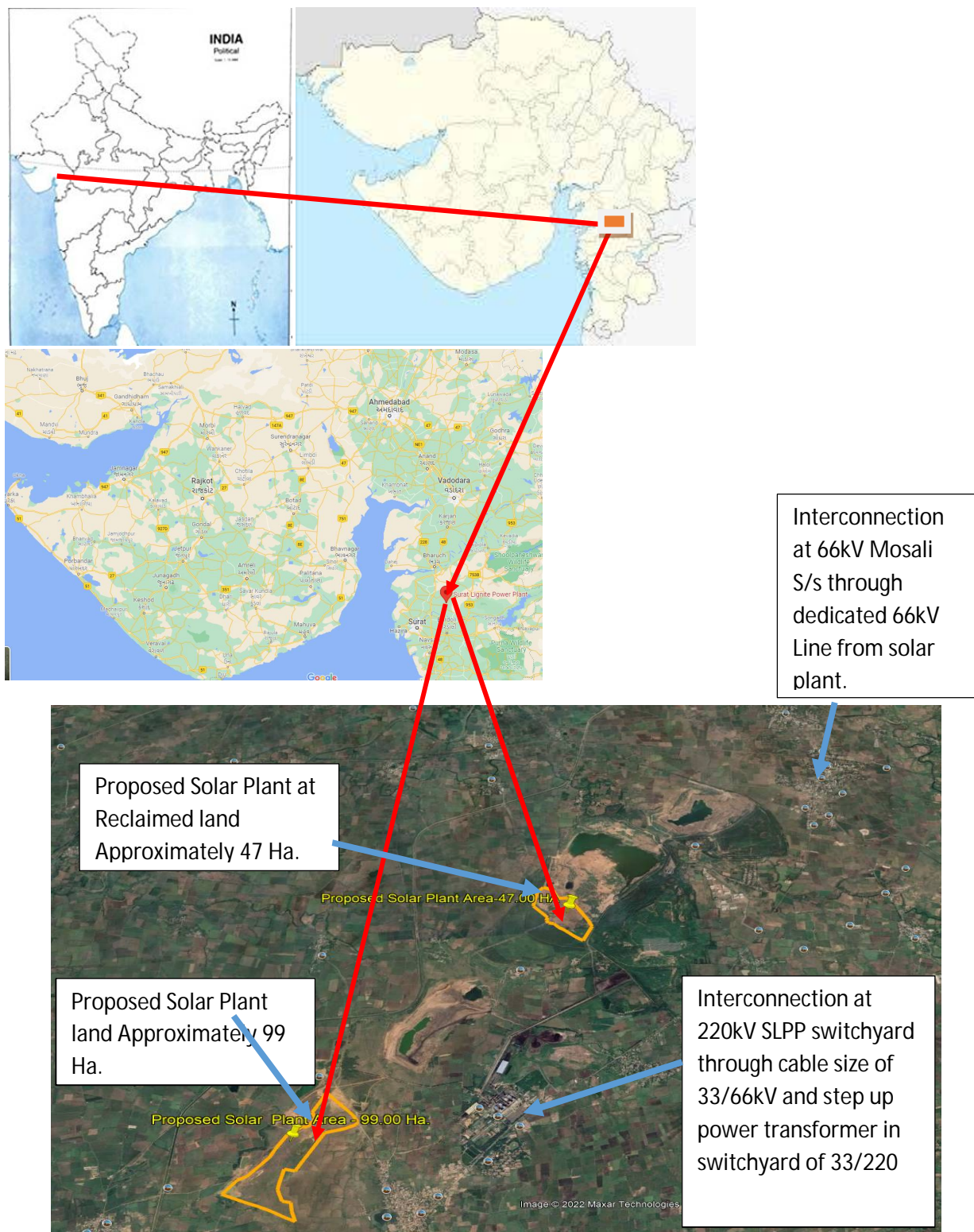
Airport

The nearest airport to the site is Surat Airport which is can be best approached via State Highway. The site is also well connected to airports at Ahmedabad and Vadodara. Ahmedabad airport is the most suitable airport to facilitate cargo transportation. The distances to the airports from the site are as follows:

The land for the proposed Project has been acquired by GIPCL.

1. The land compromising the Project Sites is available for use for this Project.
2. The preliminary topographical survey and soil survey has to be carried out by the agency i.e. EPC contractor. The scope of works shall also include making necessary approaches and measures to minimize soiling and dusting.
3. The technical report of geotechnical investigation (Soil Test report) of the site is attached for initial guidance of the Bidder. However the agency has to carry out soil investigation through Govt. Approved laboratory for designing of the civil foundations, structures, control room building, inverter building etc.
4. Details of Land for the Project: There are two plots at where the solar PV power plant is been proposed

KEY MAP OF SITE



Annexure-A2: Advance Payment Guarantee

(To be executed on non-judicial stamped paper appropriate Value)

B. G. No. _____ Date: _____

1. In consideration of Gujarat Industries Power Company Limited, having its office at Post: Ranoli, Dist. Vadodara – 391 350, Gujarat State, India (hereinafter called “The Company Owner” which expression shall unless repugnant to the subject or context includes its legal representatives, successors and assigns) having agreed to make an advance payment of Rs..... (Rupees..... only) to M/s. (hereinafter called “the said Contractor (s)/ Seller(s)” which expression shall unless repugnant to the subject or context includes their legal representatives, successors and assigns) from the demand, terms and conditions of Contract/Order dated.on production of a bank guarantee of equivalent amount.
2. WeBank having its branch office atdo hereby agree and undertake to pay the amount due and payable under this guarantee without any demur, merely on a demand from the Company stating that in the opinion of the Company which is final and binding, the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company by reason of non-payment / adjustment of any part of the said advance or any dues to the company or any breach by the said Contractor(s)/seller(s) of any of the terms and conditions contained in the said contract(s) orders(s) or by reasons of the Contractor(s)/ Seller(s) failure to perform the said Contract(s)/ Order(s). Any such demand made on the Bank by the owner shall be conclusive as regards the amount due and payable by the Bank under this guarantee, However, our liability under this guarantee shall be restricted to an amount not exceeding Rs.....(Rupees.....only).
3. We undertake to pay to the Company any money so demanded notwithstanding any claim dispute or disputes raised by the contractor (s)/ Seller(s) in any suit or proceeding pending before any office, court or tribunal relating thereto our liability under this present guarantee being absolute and unequivocal. The payment so made by us under this bond shall be valid discharge of our liability for payment there under. Our liability to pay is not dependable or conditional on the owner proceeding against the Contractor(s)/ Seller(s).
4. The guarantee herein contained shall not be determined or affected or suspended by the liquidation or winding up, dissolution or change of constitution or insolvency of the said Contractor(s)/Sellers but shall in all respect and for all purposes be binding and operative until payment of all money due or liabilities under the said Contract(s)/Order(s) are fulfilled.



5. WeBank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract(s)/Order(s) and that it shall continue to be enforceable till all the dues of the company under or by virtue of the said Contract(s)/Order(s) have been fully paid and its claims satisfied or discharged or till a duly authorized officer of the Company certifies that the terms and conditions of the said Contractor(s)/ Order(s) have been fully and properly carried out by the said Contractor(s)/Seller(s) and accordingly discharges the guarantee.
6. Notwithstanding anything contained herein before, our liability shall not exceed Rs..... (Rupees.....only) and shall remain in force till project completion date..... as per LOI reference..... dated..... Unless a demand or claim under this Guarantee is made on us within three months from the date of expiry we shall be discharged from all the liabilities under this guarantee.

Date.....

.....Bank

Corporate Seal of the Bank

By its constitutional Attorney

Signature of duly Authorized person
On behalf of the Bank
With Seal & Signature
code

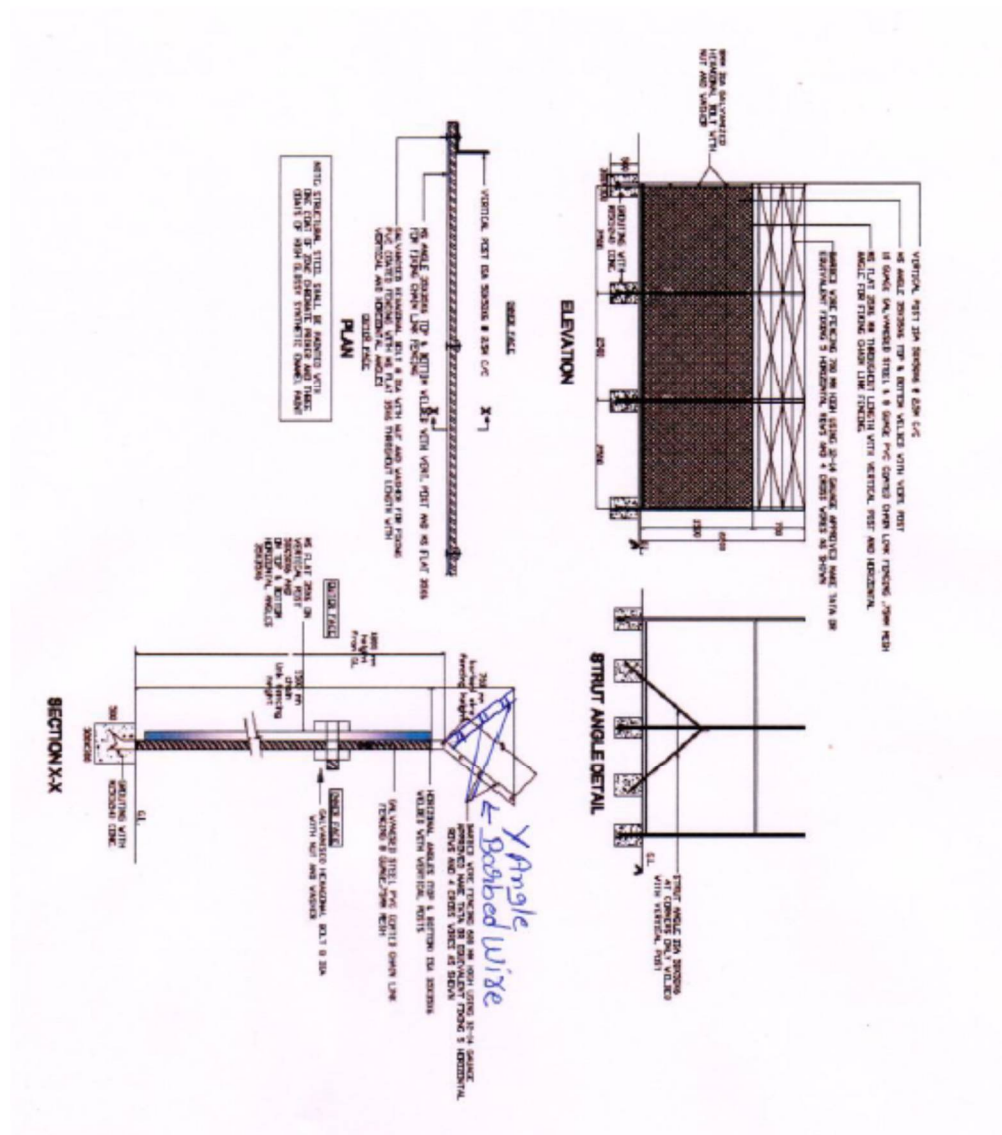
Note: BGs to be furnished from any of the banks listed at Appendix 17.



Annexure-A3: Plot Details of 75 MW (AC) Solar Project

Refer Attachment 1;

The below drawing is indicative, the depth of foundation shall be as per the design-





Annexure-A5: Soil Investigation Report

Soil Investigation Report for proposed 75 MW (AC) Solar Project near Surat Lignite Power Plant of GIPCL, is attached



Annexure-A6: Water Test Report

Void

Annexure A7: Operation and Maintenance

Operation and Maintenance (O & M)

Operation & Maintenance period shall be as mentioned in NIT. The start of O&M and first year operation shall be considered after successful completion of operational acceptance test or 60 days from date of commissioning of 75 MW (AC) whichever is earlier. Part commissioning shall be accepted as per GUVNL RFS document no. GUVNL / 500 MW / Solar (Phase XIII) dated 03.01.2022. Further all the guarantees related to NEEGG / Incentive shall also be applicable.

Guideline for Operation and Maintenance (O&M) after O&M:

O&M Contract shall cover complete Solar PV Power plant and power evacuation system up to inter connection point (66 kV GETCO end S/S or up to 220kV Switchyard of Surat Lignite Power Plant of GIPCL) as specified elsewhere in the Contract. Contractor to achieve guaranteed Generation in respective O&M year.

Further, it is the responsibility of the Contractor to liaison with the following authorities:

- (a) Liaison with State/Central Government.
- (b) Liaison with State Power Utilities.
- (c) Liaison with State Renewable Agency.
- (d) Any other department / agency as may be required.
- (e) GIPCL shall provide required documents.

O&M OF PLANT

Comprehensive operation & maintenance of the Solar PV plant including supply of spare parts, consumables, repairs/replacement of any defective equipment etc. shall be performed by the Contractor for a period of 03 years (warranty period).

During O&M period, employer personnel shall have unrestricted entry to the solar plant and Control Room any time. GIPCL may depute its personals to associate with O&M activities. The

Contractor shall assist them in developing expertise through their day to day O&M activities and all records of maintenance must be maintained by the contractor which can be accessed by employer on demand. These recordings are to be handed over to employer after the O&M period of contract.

During O & M period, all the annual charges related to GETCO and SLDC shall be in the Scope of Contractor.

During the O&M period, the Contractor shall be responsible for any defect in the work due to faulty workmanship or due to use of sub-standard material in the work. Any defects in the work during the warrantee period shall there be rectified/replaced by the contractor without any extra cost to the employer within a reasonable time as may be considered from the date of receipt of such intimation from employer failing which employer shall take up rectification work at the risk and cost of contractor.

The Contractor shall be responsible for supply of all spare parts, repairs / replacement of any defective equipment(s) including civil works at his own cost as required from time to time during the O&M period.

During O & M period the Contractor shall be responsible for all the activities required for the successful running, optimum energy generation etc. This shall include but not necessarily be limited to following:

1. Deputation of adequate number of O&M, engineering and supporting personal, security etc. Compliance of rules and regulations defined in GUVNL tender [RfS No. GUVNL / 500 MW / Solar (Phase XIII) dated 03.01.2022 and PPA including subsequent clarifications or amendments issued from time to time] for manpower.
2. O&M Contractor shall have to fill at least 65% of post in supervisory and managerial cadres and 80% of posts in other cadres by the local persons. The expression “Local person “ shall mean a person domiciled in Gujarat state for minimum 15 years shall be considered as local person.
3. Operation part consists of deputing necessary manpower necessary to operate the Solar Photovoltaic Power Plant at the optimum capacity. Operation procedures such as preparation to start, routine operations with safety precautions, monitoring of Solar Power Plant etc. shall

be carried out as per the manufacturer's instructions to have trouble free operation of the complete system.

4. Daily work of the operators in the Solar Photovoltaic Power Plant involves cleaning of Modules, logging the voltage, current, power factor, power and energy output of the solar Power Plant. The operator shall also note down failures, interruption in supply and tripping of different relays, reason for such tripping, duration of such interruption etc.
5. The Contractor shall demonstrate guaranteed generation as quoted in respective O&M year. In case the contractor fails to achieve the guaranteed generation, then penalties shall be recovered as defined in this Tender.
6. Water cleaning of SPV modules. The Contractor shall wash the modules minimum twice in a month and maintain this schedule in its records for the cleaning cycle.
7. Housekeeping of complete power plant.
8. Reporting the energy generation data to GIPCL.
9. Monitoring, controlling, troubleshooting, maintaining of records, registers etc.
10. Recording/logging of all the operational parameters (e.g. voltage, current, power factor, energy output, temperature etc.) and preparation of daily/weekly/monthly reports etc. including submission of periodical consolidate plant performance reports to the Owner / GIPCL.
11. Conducting periodical checking, testing, over hauling and preventive action of all equipment in systematic method including regular cleaning of PV modules of the solar PV plant as per OEM guidelines.
12. The contractor shall carry out the periodical/plant maintenance as given in the manufacturer's service manual and requirement.
13. Cleaning including cutting/removing of bushes/vegetation etc. of the complete plant on regular basis and as and when required.
14. Particular care shall be taken for outdoor equipment to prevent corrosion. Cleaning of the junction boxes, cable joints, insulators etc. shall also be carried out at every month interval.
15. Resistance of the earthing system as well as individual earthing is to be measured and recorded every month. If the earth resistance is more than 3 ohm, suitable action is to be taken to bring down the same.
16. According to the recommendations stock of special tools and tackles shall be maintained for Modules, PCU's and other major electrical equipment.

17. Breakdown / Corrective Maintenance: Whenever a fault has occurred, the contractor has to attend to rectify the fault & the fault must be rectified at the earliest time from the time of occurrence of fault. The O&M also includes comprehensive O&M of plant as well as transmission system up to interconnection point.
18. A maintenance record is to be maintained by the contractor to record the regular maintenance work carried out as well as any breakdown maintenance along with the date of maintenance reasons for the breakdowns steps have taken to attend the breakdown duration of the breakdown etc.
19. The Schedules will be drawn such that some of the jobs other than breakdown, which may require comparatively long stoppage of the Power Plant, shall be carried out preferably during the non-sun period.
20. The Contractor shall ensure that all safety measures are taken at the site to avoid accidents to his employees or his co-contractor's employees as per prevailing safety rules.
21. In order to ensure longevity, safety of the core equipment and optimum performance of the system the contractor should use only genuine spares of high quality standards.
22. Supply of all spares, consumables and fixing / installation of the same including proper storage of tool, tackles & spares.
23. The Contractor shall at his own expense provide all amenities to his workmen as per applicable laws and rules.
24. The Contractor shall immediately report the accidents, if any, to the Engineer In charge & to all the concerned authorities as per prevailing laws of the state.
25. The Contractor shall comply with the provision of all relevant Acts of Central or State Governments including payment of Wages Act 1936, Minimum Wages Act 1948, Employer's Liability Act 1938, Workmen's Compensation Act 1923, Industrial Dispute Act 1947, Maturity Benefit Act 1961, Employees State Insurance Act 1948, Contract Labour (Regulations & Abolishment) Act 1970 or any modification thereof or any other law relating thereto and rules made there under from time to time.
26. Coordinating, on behalf of GIPCL, and obtaining renewal of statutory licenses, clearances and approvals from state departments such as State Electricity Supply & Transmission Boards/CEIG/GEDA etc.
27. Compliance of Scheduling and forecasting shall be carried by the successful EPC contractor as per **GERC Notification No.1 of 2019**(FORECASTING, SCHEDULING, DEVIATION

SETTLEMENT AND RELATED MATTERS OF SOLAR AND WIND GENERATION SOURCES) REGULATIONS, 2019 and any changes from time to time. Further all the cost for hiring QCA (Qualified Coordinating Agency) for forecasting and scheduling shall be in scope of the Successful EPC contractor.

28. Penalty due to mismatch in scheduling and forecasting shall be equally shared by GIPCL and the successful EPC Contractor.
29. Contractor shall keep updating the spares inventory at the site every time there is consumption of spare items towards replacement.
30. Coordinating with sub-station upon grid failures, line problems etc. and implementing the needful steps to restore the plant to normal operation
31. Theft incidents: immediate reporting to GIPCL, filing FIRs with police stations on behalf of GIPCL, coordination for site inspection by insurance companies and clearance of insurance claims, logging of events (date, time) and maintaining records
32. Proper housekeeping shall be maintained during O&M period by the Contractor.
33. Required security personnel shall be deployed for Plant security, round the clock.

All the civil defects, rectification, repairing, replacement related to civil works shall be in the scope of contractor during the O&M period. The Contractor shall be responsible for rectification of any defect in the civil work and maintain the structure/buildings in good condition with proper maintenance. The Contractor shall be responsible for the maintenance of each civil works carried out as mentioned below.

1. Buildings Control room premises, Underground water tank includes:
 - I. Water tightness of roof and walls.
 - II. Painting to the structure either PEB/ RCC Framed structure at regular interval (not more than five years).
 - III. Plumbing & Sanitation related defects/replacement.
 - IV. Chalking / overflow of septic tank and soak pit.
 - V. Replacement / repairing of water tank if major/minor leakage observed.
 - VI. Leakage of water to be attended by suitable crack filler.
 - VII. Repairing/replacement of doors, windows, ventilators & rolling shutter.
2. Road WBM or Bitumen:
 - I. Crack repairing of the road surface.

- II. Pot-holes over the top road surface to be rectify.
 - III. Maintenance of shoulders for the rain cuts or damage due to some external reasons.
 - IV. Re-carpeting of the road surface at every five years interval.
3. Storm water Drainage:
 - I. Before and after the monsoon season the storm water drainage shall be maintained & cleaned for smoother flow of storm water.
4. Main Entry gate & Fencing:
 - I. Maintain the elegance of entry gate with painting as & when required.
 - II. Repairing & painting of fencing as & when required.

The above list is not exhaustive but indicative only. Although most of the structures are covered here in, any other system (Civil, Structural and Architectural) required for successful operation and maintenance of the works shall form a part of this contract and shall be deemed to be included in the scope of works. The scope of Bidder/EPC Contractor is including supply of all required materials, mobilization of labour, and arrangement of required tools tackles and equipment to carry out all above civil maintenance works.

HANDING OVER THE FACILITIES

After expiry of O&M period, the Contractor shall hand over the Facilities to Employer in good operating condition along with requisite tools & tackles and spares etc. The Contractor shall demonstrate functional operations of all the major & critical Plant & Equipment. The spare if consumed during O&M period then same shall be replenished at the time of handing over of facilities.

--- End of Document---



Annexure A8: GUVNL Tender & PPA and Other Documents

Refer Attachment: 4

--- End of Document---