Chhattisgarh State Renewable Energy Development Agency (CREDA)

(Dept. of Energy, Govt. of Chhattisgarh)

(Dept. of Energy, Govt. of Chhattisgarh)

Near Energy Education Park, Village Fundhar
VIP Road (Air Port Road) Raipur (Chhattisgarh)
Website: http://creda.co.in

BID DOCUMENT No 19508/CREDA/Raipur/SPVPP-ON GRID/Dtd.27.02.2020

Design, Supply, Installation and Commissioning of Grid Connected Solar Photovoltaic Power Plants of different capacity at three different locations in Chhattisgarh State as mentioned below:-

1) **220KV Sub Station, MOPKA, Division C.S.P.T.C.L, Bilaspur – 10 KWp.**
2) **Chhattisgarh State Warehousing Corporation Building, Sector-24, Nava Raipur, (With Elevated Structure on rooftop) - 25 KWp.**
3) **Pt. Deendayal Upadhyay Memorial Health Sciences & Ayush University, Uparwara, Nava Raipur (on Parking Shed) – 70 KWp.**

Bid Document Cost- Rs 5000.00 + 18% GST = Rs.5900.00 (in words Rupees Five Thousand nine hundred Only)

Document can also be downloaded from our website http://creda.co.in cost of bid documents as mentioned in NIT have to be deposited along with tender document.

CHHATTISGARH STATE RENEWABLE ENERGY DEVELOPMENT AGENCY

CONTENTS

Ref. No. /CREDA/ SPVPP OnGrid/Bid/2019-20/19508 **Date: 27.02.2020**

NOTICE INVITING BID

CREDA invites sealed bid from Experienced System Integrators for design, supply, installation and commissioning of Grid Connected Solar Photovoltaic Power Plant with five years Comprehensive Maintenance F.O.R. site at following Location:-

S.No	Site	Capacity	Estimated Cost of Work	EMD in Rs.
1	220KV Sub Station, MOPKA, Division C.S.P.T.C.L, Bilaspur Chhattisgarh.	10 KWp	4.30 Lakhs	13000/-
2	Chhattisgarh State Warehousing Corporation Building, Sector-24, Nava Raipur, Chhattisgarh. **(With Elevated Structure on rooftop)**	25 KWp	12.00 Lakhs	24000/-
3	Pt. Deendayal Upadhyay Memorial Health Sciences & Ayush University, Uparwara, Nava Raipur Chhattisgarh. **(on Parking Shed)**	70 KWp	50.00 Lakhs	100000/-

S.No	Particulars	Date	Time	Place
1	Submission of Bid	27.03.2020	12.00 PM	Chief Engineer (RE II) Office CREDA H.O Raipur
2	Opening of Bid	27.03.2020	03.00 PM	

Details of the bids are mentioned at Bid Documents which can be downloaded from our website ***http://creda.co.in***
The bidder should have to deposit bid document cost, along with EMD as mentioned above through demand draft payable to "CREDA Raipur" while submitting bid.

CREDA reserves all rights to accept/reject any or all bids in full/Part without assigning any reasons.

(Sanjeev Jain)
Chief Engineer

CHECK LIST

To ensure that your bid submitted to CREDA is complete in all respects, please go through the following checklist & tick mark for the enclosures attached with your bid:

S.No.	Description	Complied	Page no. /Flag
1	Earnest Money Deposit **(EMD)** (proof of submission)		
2	Bid Document Fee (proof of submission)		
3	The original document should be duly sealed and signed with stamp in each page, as a confirmation of acceptance of Terms & Conditions (T&C)		
4	Copy of SI Registration Certificate CREDA in SPV Programme for FY 2019-20 of "C" or "B" Category.		
5	Original Net Worth Certificate and Turnover Certificate duly signed by Chartered Accountant		
6	Completion and Performance Certificates of installed SPV Power Plants **Bidder should have an experience of Supply, Installation and commissioning of minimum 05 Nos. Grid Connected Roof Top SPV Power Plants of minimum aggregate capacity 200 KW on CREDA Mode/Market Mode in Chhattisgarh or any other state within India through State Nodal Agencies of MNRE or SECI.**		
7	Copy of certificate for last three years Turn Over of Works done regarding SPV Projects		
8	Forwarding Letter & Undertaking by the Bidder		
9	PAN, GSTIN, Tax clearance certificate of the Bidder		
10	Self-certificate from Tenderer on not being a debarred from Government contract or a blacklisted company.		
11	Declaration of the Bidders about any relatives working with CREDA		

Details of EMD & Bid Document Fee Attached

S.No.	Description
1	**Earnest Money Deposit** – Earnest Money Deposit of Rs. ..... /-, submitted in the form of Demand Draft/Banker's Cheque, drawn on ..... Bank, ...Branch, bearing DD/BC No..... dated.....is attached herewith.
2	**Bid Document Fee** – Bid Document Fee of Rs. 5000.00 + GST @ 18%, submitted in the form of Demand Draft/Banker's Cheque, drawn on ..... Bank, ...Branch, bearing DD/BC No..... dated.....is attached herewith.

(Sign & Seal of the Bidder)

UNDERTAKING OF THE BIDDER

I/We have visited the site prior to submission of the bid documents and found that following sites are clear and suitable for installation :-

1) 220 KV Sub Station, Mopka, Division C.S.P.T.C.L, Bilaspur, Chhattisgarh (**10 KWp**).
2) Chhattisgarh State Warehousing Corporation Building, Sector-24, Nava Raipur, Chhattisgarh. **(25 KWp) (Elevated Structure)**.
3) Pt. Deendayal Upadhyay Memorial Health Sciences & Ayush University, Uparwara ,Nava Raipur Chhattisgarh. **(on Parking Shed) (70 KWp**).

I/We have also visited and inspected the probable terminating point of Grid Synchronization at site;-

1) 220 KV Sub Station, Mopka, Division C.S.P.T.C.L, Bilaspur, Chhattisgarh (**10 KWp**).
2) Chhattisgarh State Warehousing Corporation Building, Sector-24, Nava Raipur, Chhattisgarh. **(25 KWp) (Elevated Structure)**.
3) Pt. Deendayal Upadhyay Memorial Health Sciences & Ayush University, Uparwara ,Nava Raipur Chhattisgarh. **(on Parking Shed) (70 KWp).**

I/We have read carefully and examined the notice inviting bid, schedule, General Rules and terms and conditions of the contract, special conditions, Schedule of Rates and other documents and Rules referred to in the bid document for the work.

I/We hereby bid my rates for the execution of the work for CREDA as specified within the time stipulated in the schedule in accordance with all aspects with the specifications, designs, drawings and instructions with such conditions so far as applicable.

I/We agree to keep the bid open for Ninety (90) days from the due date of submission thereof and not to make any modifications in its terms and conditions.

A sum of Rs ..... Lakhs is hereby submitted as earnest money in the form of crossed demand draft payable to CREDA at Raipur (C.G.) for each site. If I/We, fail to commence or complete the sanction ordered in specified time I/We agree that the CREDA shall, without prejudice to any other right or remedy, be at liberty to forfeit the said Earnest Money absolutely. The said Earnest Money shall be retained by CREDA towards security deposit to execute all the works referred to in the bid documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be required by CREDA.

I/We hereby declare that I/We shall treat the bid documents, specifications and other records connected with the work as secret/confidential and shall not communicate information derived there from to any person other than a person to whom I/We have authorized to communicate the same or use the information in any manner prejudicial to the safety of CREDA/Government.

I/We shall abide to all the laws and shall be responsible for making payments of all the taxes, duties, levies and other Govt. dues etc. to the appropriate Govt. departments.

Our state sales tax registration TIN No. is _____ and GST registration No._____. The PAN No. under the Income Tax Act is _____.

I/We shall be responsible for the payment of the respective taxes to the appropriate authorities and if I/we fail to do so, I/we hereby authorize CREDA to recover the taxes due from us and deposit the same with the appropriate authorities on their demand.

Dated: Signature

Place: Name of Bidder with seal

Witness Name ----------

Postal address ----------

Signature ----------

INSTRUCTIONS FOR BIDDERS

1. **Eligibility Criteria:**

A. Bidder should be registered in CREDA as a System Integrator in "B" or "C" Category, in SPV Programme for the financial year 2019-20. In case the bidder is eligible with respect to the eligibility criteria as mentioned in S.No.1 (B) below and is not registered as System Integrator in CREDA in "B" or "C" Category then such bidder shall have to get themselves register if they win the bid, before award of Letter of Intent (LOI) to them. Bidder should be aware of the terms & conditions of getting registered in CREDA as System Integrator in "B" or "C" category. Hence if the successful bidder does not fulfil the eligibility of such registration then such bidder will be rejected & their EMD will be forfeited.

B. Bidder should have minimum direct experience of Supply, Installation and Commissioning of **minimum 05 Nos. Grid Connected Roof Top SPV Power Plants of minimum aggregate capacity of 200 KW *on CREDA Mode/Market Mode in Chhattisgarh or any other state within India through State Nodal Agencies of MNRE or SECI.*** Satisfactorily completion certificate issued by Govt/ Govt Undertaking/SNA/SECI shall only be considered.

C. Bidders must have a positive net worth of Rs.5.00 Lacs as on **31st March 2019 (which is defined as "Net value of the Assets minus(-) Net value of liabilities")**.They shall have to submit a Original Certificate duly signed by a qualified and registered Chartered Accountant having UDI number as a proof. Produced certificate must tally with the audited balance sheet.

D. Bidders should have an aggregate turnover of minimum 2 Crores in last three years i.e. 2016-17, 2017-18 & 2018-19 in SPV Projects. Certified copies of the annual returns and audited balance sheet submitted to the Registrar of Companies/ Income Tax Authorities should be enclosed. For the preceding years a **Original Summarised Sheet** of turnover certified by registered CA must be enclosed.

E. Bidder will have to submit audited copy of balance sheet certified by a registered chartered accountant as a proof for S. No.1(C) and 1(D) above.

F. The Bidder should have valid CST/State VAT/TIN/Service Tax registration certificate/GST (whichever is applicable) in the state. A copy of each certificate should be enclosed along with bid document.

G. Bidders must have their office and service centre in Chhattisgarh State, in case they win the bid, before issuance of LOI. If the bidder do not comply this condition within one month of winning bid then such bidder will be rejected & their EMD will be forfeited. Bidder shall have to submit compulsorily an undertaking in the prescribed format "Annexure B".

H. Authorization of person representing & signing the bid document from Director / Proprietor / Partner of the Firm/ Company of the bidder if they themselves are not doing so.

I. Bidder will have to submit a copy of relevant test reports from MNRE approved test labs for SPV Modules/Inverters, if they win the bid.

J. Bidder who is debarred from business by Govt/Govt agency in any state would not be eligible to participate in this bid. A self-declaration should be submitted by the bidder to this effect, failing which bid shall be rejected.

- If System Integrator, who is already registered in CREDA, fails to

accomplish their CREDA assigned projects timely or to provide service /onsite warrantee timely for their non functional SPV systems and who are subsequently warned by CREDA for the same, may be treated as defaulters and they may not be allowed to Participate in this bid.

2. Bid Documents should be dropped in the bid box kept in the Head Office, CREDA, Raipur in SPV Office of C.E RE-II ---------- upto -------- Bids after scheduled time and date shall not be accepted.

3. Bid Documents should be submitted in prescribed manner in separate envelops duly super scribed and placed as follows- (I)Bid Fees and EMD , (II) Eligibility Documents as per point 1(A) to 1(J) mentioned above (III) Technical Bid and Complete bid document in original duly signed by authorized signatory on each & every page of the bid document. (IV) Price Bid.

4. The envelopes must be clearly marked as "(I) Bid Fees and EMD /(II) Eligibility Documents / (III) Technical Bid and Complete bid document in original / (IV) Price Bid. **"BID No19508/CREDA/Raipur/SPVPP-ON GRID/Dtd27.02.2020"**

5. The Specifications of SPV Power Plant Systems should be as specified in the bid in schedule attached.

6. The documentary evidence for meeting the eligibility criteria must mandatorily be submitted along with as per check list with bid in prescribed manner.

7. Each offered solar module should have PID Test report & I-V curve measured with a sun simulator of a SPV Module Manufacturer registered/approved by MNRE with record of suitable calibration reference, as per guidelines of MNRE.

8. When Bid documents are delivered through messenger, it should be submitted in the bid box kept in the office of the Chief Engineer (RE II), CREDA, H.O., Raipur on or before 12.00 PM dated 27.03.2020. Nobody is authorized to receive or grant receipt for bid delivered on behalf of CREDA.

9. Bidder should note that this is site specific bid hence should quote their rates considering variation of site conditions, variation in price of different components, connectivity of Solar System, Synchronization of complete Solar Power Plant connectivity to bidirectional energy meter and also keeping the quantum & quality of work in mind. If CREDA anticipates that rate is abnormally low or high, CREDA shall have liberty to amend the rates or reject the bid.

10. **VALIDITY:** Full descriptive Particulars and complete specifications should accompany the offer. Offers should be kept open for acceptance for at least three months from the date of opening. After finalization of this bid the approved rates shall be valid till one year from the date of award; however CREDA shall have liberty to increase or decrease this validity if needed.

11. The terms, conditions and specifications mentioned in bid document shall be binding on the bidders and no condition or stipulation contrary to the conditions shall be acceptable. It may please be noted that the bidders who do not accept terms and conditions stipulated in this bid documents, their offers shall be liable to be rejected out-rightly without assigning any further reasons.

12. Each page of bid document & enclosures shall be signed by the bidder and seal affixed. All the pages of the documents issued must be submitted along with the offer. In case of any corrections / alterations in the bid, the bidder should attest the same; otherwise bids may not be considered.

13. **Bidders are also instructed to submit their bids in properly arranged manner (with index, proper paging and with flags on related documents). Incomplete, lose, conditional or improper arranged bids will not be accepted.**

14. CREDA reserves the right to reject or accept any or all bids wholly or Partly without assigning any reason on the grounds considered advantageous to CREDA, whether it is the lowest bid or not obtained in this bid.

15. Offers through Telegraph/ Fax/Emails or open offers etc. received shall be summarily rejected.

16. All the bidders shall essentially indicate the break-up of prices as shown in Price Bid. In case any of the charges are not included in the quoted prices, the same shall be clearly shown as extra, indicating specifically the rate/scale of such charges. The lowest prices quoted shall be considered.

17. **BID DOCUMENT FEE AND EARNEST MONEY:**

Each bidder should submit Bid Document Fee and earnest money in the form of Demand Draft/Pay Order or RTGS/NEFT (proof to be attached) as mentioned in the BID DOCUMENT No.19508/CREDA/Raipur/SPVPP-ON GRID/Dtd. 27.02.2020 in a separate envelope as prescribed at point no. 3 of page 7 else they will summarily be rejected and returned. Bid Document Fee, EMD submitted in any other form e.g. Cash/Bank Guarantee/ FDR/TDR etc shall not be accepted.

18. **FORFEITURE OF EARNEST MONEY DEPOSIT**:

It should be clearly understood that in the event of bidder failing to enter into the agreement in the prescribed format on their quoted rates or fails to execute assigned works as per work order issued to successful bidder, within stipulations, if he is so communicated within the validity period of the offer, the full amount of earnest money shall be forfeited and bidder will be debarred from future business with CREDA. CREDA's decision in this respect will be final and binding on the bidder.

19. **PRICE:**

The prices quoted should be firm and F.O.R. destination including relevant GST and all duties, packing, forwarding freight, insurance and any other incidental charges. Eligible bidder will have to submit break up of costs and taxes before execution of agreement with CREDA so as to ensure tax deposition as per Govt Rules accordingly. Please note that “C” Forms/ Any Road Permit shall not be issued by CREDA.

20 **ENGINEERING DOCUMENT:**

Bidders will have to submit site specific Engineering Documents with technical details, drawings, Specifications of components and make etc to CREDA for approval prior to execution of the work, as and when asked by CREDA. Works may only be started out only after approval of the Engineering Document and their samples.

21 SAMPLES:

If required, CREDA may inspect the consignment before dispatch of the material from manufacturer's locations to the site of installation, at the cost of bidder and shall be delivered/ accepted as per the scope of work and specifications. If required, CREDA may also send, at its own discretion any Part of Solar System for getting tested in accredited laboratory at the cost of bidder.

22 TAX OBLIGATIONS:

CREDA shall deduct TDS for Income Tax, GST, and applicable cess on Civil Work etc. under various acts and deposited with the appropriate authority. Eligible bidder will have to submit break up of costs and taxes before execution of agreement with CREDA so as to ensure tax deposition as per Govt Rules accordingly.

23 Provident fund and benefit of Employee State Insurance Corporation is applicable as per Govt. Rules

24 JURISDICTION OF THE COURT: Any dispute arising out of the contract shall be subject to the jurisdiction of Hon'ble High court in Chhattisgarh.

GENERAL CONDITIONS OF CONTRACT

1 DEFINITIONS: In writing General Conditions of Contract, the specifications and bill of quantity, the following words shall have the meanings hereby indicated, unless there is something in the subject matter or content inconsistent with the subject.

CREDA shall mean the Chhattisgarh State Renewable Energy Development Agency represented through the CEO.

Work shall mean any work entrusted to the bidder as mentioned in the scope of work order.

The "Engineer in charge" shall mean the Engineer or Engineers authorized by CEO, CREDA for the purpose of this contract. Inspecting Authority shall mean any Engineering person or personnel authorized by CREDA to supervise and inspect the erection of the SPVPP.

"The Eligible/Successful Bidder" shall mean the bidder awarded with the contract or their successors and permitted assigns.
"General Conditions" shall mean the General conditions of Bid.

"Specifications" shall mean the specifications annexed to these General Conditions of bid document and shall include the schedules and drawings attached hereto or issued to the eligible bidder from time to time, as well as all samples and pattern, if any,

"Month" shall mean calendar month. "Writing" shall include any manuscript, typewritten, printed or other statement reproduced in any visible form whether under seal or written by hand.

2. CONTRACT DOCUMENT:

The term "Contract" shall mean and include the General conditions, specifications, schedules, drawings, letter of intent, sanction orders, work order etc., issued against the contract schedule of price or their final general conditions, any special conditions applying to the Particular contract specification and drawings and agreement to be entered into. Terms and conditions not herein defined shall have the same meaning as are assigned to them in the Indian Contract Act or any other Act in vogue or by any person of common knowledge and prudence.

3. MANNER OF EXECUTION:

Execution of work shall be carried out in an approved manner as outlined in the technical specifications or where not outlined, in accordance with desired Specifications laid down by CREDA, to the reasonable satisfaction of the Engineer.

i) The eligible bidder shall conduct a detailed survey of site and submit Site Clearance and necessary documents and survey details through concerned District/Regional Office of CREDA in prescribed manner.
ii) District/Regional Office CREDA shall examine these reports and after satisfaction, forward these to Chief Engineer in-charge of SPV Grid Connected Project in Head Office of CREDA, Raipur for approval.
iii) The Bidder shall start work within 15 days after the date of issue of work Order. Work order will be given to the eligible Bidder only after execution of the agreement with CREDA.
iv) All the materials required for the installation of SPV Power Plant as per Work Order issued shall be kept at site in the custody of the eligible bidder. CREDA or the beneficiary shall not be responsible for any loss or damage of any material during the installation.

v) All the electrical works should be done as per Indian Electricity Act. The persons engaged for carrying out electrical works should have a valid license of A Class Electrical Contractor.

vi) After installation, joint inspection will be done in presence of beneficiary, authorised representative of bidder and concerned CREDA officials. After successful commissioning of SPV Power Plant and its approval from CREDA, a JCC will be signed and the payment claim will be forwarded for payments as per guidelines and procedures of CREDA.

4. VARIATIONS, ADDITIONS & OMMISSIONS:

CREDA shall have the right to alter, amend, omit, split or otherwise vary the quantum of work, by notice in writing to the Bidder. The eligible bidder shall carry out such variation in accordance with the rates specified in the contract so far as they may apply and where such rates are not available; those will be mutually agreed between CREDA and the eligible Bidder.

5. INSPECTION DURING ERECTION WORK:

The Engineer in Charge or his authorized representative (s) shall be entitled at all reasonable times to inspect and supervise and test during installation, commissioning and maintenance of the Solar System. Such inspection will not relieve the eligible bidder from their obligations under this contract. Material can be inspected before dispatch by the authorized representatives of CREDA at the factory at the cost of the eligible Bidder, if desired by CREDA.

6. COMPLETION OF WORK:

Time being the essence of contract, the installation of the SPV Power Plant shall be completed within the time schedule prescribed in the Work Order.

7. ELIGIBLE BIDDER's DEFAULT LIABILITY:

CREDA may by written notice of default to the eligible Bidder, terminate the contract in circumstances detailed here under:

(a) If in the opinion of the CREDA, the successful Bidder fails to complete the work within the time specified in the Work Order or within the period for which extension has been granted by CREDA to the eligible Bidder.

(b) If in the opinion of CREDA, the Successful Bidder fails to comply with any of the provisions of this contract.

(c) In the event of CREDA terminating the contract in whole or in Part as provided in paragraph (a) above, CREDA reserves the right to engage another eligible Bidder or agency upon such terms and in such a manner as it may deem appropriate and the Successful Bidder shall be liable to CREDA for any additional costs or any losses caused to CREDA, as may be required for the completion of erection of the SPV Power Plant and or for penalty as defined under this bid document until such reasonable time as may be required for the final completion of the work.

(d) In the event CREDA does not terminate the contract as provided in paragraph (a) the Successful Bidder shall continue performance of the contract, in which case he shall be liable to CREDA for penalty for delay as set out in this bid document until the work is completed.

8. FORCE MAJEURE:

The Successful Bidder shall not be liable for any penalty for delay or for failure to perform the contract for reasons of FORCE MAJEURE such as of Act of God, acts of public/enemy/naxal problems, acts of government, non-cooperation of beneficiary, delay in approvals from govt organisations, cyclone, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes provided that the contract, shall within 10 (ten) days from the beginning of such delay notice to CREDA in writing, of the cause of delay. CREDA shall verify the facts and grant such extension as facts justify. Delay in supply of any accessories of SPV Power Plant etc by the related vendors, to whom the bidder has placed order, shall also not be treated as force majeure until related to any of the reasons stated above under force majeure.

9. REJECTION OF WORKS:

In the event of any of the material supplied/ work done by the eligible bidder is found defective in material or workman ship or otherwise not in conformity with the requirements of this contract specifications, CREDA shall either reject the material and/ or work and advise the eligible bidder to rectify the same. The eligible bidder on receipt of such notices shall rectify or replace the defective material and rectify the work, free of cost. If the eligible bidder fails to do so, CREDA may,

i At its option replace or rectify such defective materials and/ or work and recover the extra cost so involved from the eligible bidder plus eighteen percent service charges of the cost of such rectification, from the eligible bidder and/ or terminate the contract for balance work/ supplies with enforcement of penalty as per contract

ii Defective materials/ workmanship will not be accepted under any conditions and shall be rejected outright without compensation. The eligible bidder shall be liable for any loss/ damage sustained by CREDA due to defective work.

10. EXTENSION OF THE TIME:

If the completion of installation is delayed due to any reason beyond the control of the eligible bidder, the eligible bidder shall without delay give notice to the CREDA in writing of his claim for an extension of time. CREDA on receipt of such notice may agree to extend the contract/last date of the commissioning of Solar Power Plant, as may be reasonable but without prejudice to other terms and conditions of the contract.

11. MAKES OF EQUIPMENTS TO BE USED IN THE WORK:

The eligible bidder has to ensure that equipments as per Technical Requirements of guidelines of CREDA/MNRE as complied with. The eligible bidder has also to ensure that he will use components of approved vendors of CREDA. The material/works for which CREDA/MNRE or BIS or ISI specification is not available, engineer-in-charge of the works will examine and approve the material/works, preferably of all makes on which CREDA has report of satisfactory performance. Test certificates for all major equipments should be submitted to the engineer-in-charge of the works before installation of the same.

12.WARRANTEE PERIOD AND POST INSTALLATION SERVICES:

The work done/ material supplied by the eligible bidder should be warranted for satisfactory operation and against any defect in material and workmanship including Controllers and other balance of equipments, at least for a period of 5(five) years, from the date of commissioning of the SPV Power Plant including other works as per scope of work.

Warrantee on SPV Modules shall be for 10 (ten) years from the date of commissioning of the SPV Power Plant, warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and not less than 80% at the end of 25 years. The above warrantee certificates shall be furnished to the CREDA for approval.

Any defect noticed during this period should be rectified by the supplier free of cost upon written notice from CREDA provided such defects may be due to bad workmanship or bad materials used. The warrantee period shall be extended by the period during which the plant remains non-operative due to reasons within control of the eligible bidder.

This warrantee must be an unconditional onsite warrantee and the eligible bidder will have to replace the defective material within 7days, positively, from the date of information given to him. Care should necessarily be taken to make the SPV Power Plant operational, once the reporting of the fault/non operational status is done, within a week.

If the SPV Power Plant is not made operational within 7 days CREDA may rectify the same at the cost of bidder, and the warrantee period shall be extended for a month for the same.

Eligible Bidder shall have to keep sufficient quantity of spares and man power to ensure proper service network for taking care of smooth functioning of SPV Power Plant installed by them. Bidder shall have to give a contact number to beneficiary to register complaints.

13. PLANT PERFORMANCE EVALUATION:

The successful bidder shall be required to meet Performance Ratio (PR) at the time of commissioning at the location. PR should be shown minimum of 75% at the time of inspection for initial commissioning acceptance to qualify for release of payment. The PR will be measured at Inverter output level during peak radiation conditions.

"Performance Ratio" (PR) means the ratio of plant output versus installed plant capacity at any instance with respect to the radiation measured.

PR =[Measured output in kW Installed Plant capacity in kW x 1000 W/m2]/ [Measured radiation intensity in W/m2]

14. TERMS OF PAYMENT:

The following terms of payment shall apply for the bid: -

- 95% of the eligible payment as per the work order (excluding the cost of Comprehensive Maintenance) after satisfactory supply, installation, commissioning & after satisfactory synchronization & generation report of minimum one month from the date of synchronisation & performance evaluation of the system at site with proper handing over and fulfilling following conditions

  i) Grid Connectivity Approval letter from the Concern Divisional Office of CSPDCL.

  ii) Copy of Minutes of Metering (MOM) duly signed by authorised officers of CREDA, CSPDCL and Beneficiary organisation at the time of Grid synchronisation.

  iii) Installation of water pipe line for cleaning of Solar Modules as per approval of CREDA.

  iv) Generation report of minimum one month from the date of synchronisation verified by concern CREDA's Regional Office.

- 5% of the eligible payment shall be retained by CREDA as performance security for a period of 60 months.

The following terms of payment shall be applicable for release of payment of Comprehensive Maintenance: -

1. Date of Synchronisation of installed power plant shall be considered as date of Commissioning of plant.
2. Report of Comprehensive maintenance has to be submitted as per attached scope of work every month through concern District & Regional office to SPV Grid Connected Cell of HO, CREDA. Payment would be done after each quarter (Every three months). The five year rate quoted by the successful bidder would be divided by 20 so as to get the rate at which quarterly payment has to be made.
3. Rest of the terms & conditions of the bid would be applicable.

15. PENALTY FOR DELAY IN COMPLETION OF CONTRACT:

If the eligible bidder fails to complete the erection, testing and commissioning etc, within the phased time schedule specified in the work order or any extension granted there to, CREDA will recover from the eligible bidder as penalty a sum of one percent (1.0%) of the Work Order Cost for each calendar month of delay or Part thereof. For this purpose, the date of commissioning shall be reckoned as the date of completion. The total penalty shall not exceed 5% (five percent) of the Work Order cost.

Review of the progress of work allocated to the bidder shall be done time to time by CREDA and if the progress of work is found unsatisfactory, the allocation of entire remaining work or their part can be re-allocated to other SI as per discretion of CREDA.

16. Security Deposit (SD) and Earnest Money Deposit (EMD):

A. The Earnest Money shall be retained by CREDA up to the validity of TENDER, after agreement is done to execute all the works referred to in the Bid documents upon to terms and conditions contained or referred to therein and to carry out such deviations as may be required by CREDA.

B. EMD & 5% of the cost shall be retained as SD during the five years of warrantee period. No interest shall be payable on the Security Deposit.

C. Period for which EMD and SD are to be retained may be extended in case the warrantee period is extended due to non performance of the system.

17. INSURANCE:

The eligible bidder shall arrange insurance coverage for the materials and SPV Power Plant at his/ beneficiary's custody for the work under execution and successful commissioning and subsequent handover to the beneficiary. The eligible bidder shall take up insurance or such other measures for the manpower so as to cover the claim for damage arising under workmen's compensation Act and other applicable State/ Central laws. CREDA shall not bear any responsibility on this account.

18. PENALTY DUE FROM THE ELIGIBLE BIDDER:

All costs of damages for which the eligible bidder is liable to the CREDA will be deducted from any money due to the eligible bidder including the security deposit.

19. ELIGIBLE BIDDER'S RESPONSIBILITY:

Notwithstanding anything mentioned in the specifications of subsequent approval or acceptance of the SPV Power Plants by CREDA, if any, the ultimate responsibility for satisfactory performance of the entrusted work shall rest with the eligible bidder. If in any case the eligible bidder does not complete the work as per the work orders issued to them then CREDA may take over the task & complete the project at the cost of eligible bidder.

20. RESPONSIBILITY TO RECTIFY THE LOSS AND DAMAGE:

If any loss or damage occurs to the work or any Part thereof or materials/ plant/ equipments for incorporation therein the period for which the eligible bidder is responsible for the cause thereof or from any cause whatsoever, the eligible bidder shall at its own cost rectify/ replace such loss or damage, so that the permanent work confirms in every respect with the provision of the contract to the satisfaction of the Engineer. The eligible bidder shall also be liable for any loss or damage to the work/ equipments occasioned by him in course of any operation carried out to him during performing the contract.

21. RESPONSIBILITY TOWARDS THE WORKMAN OR OUT SIDERS:

The eligible bidder shall have to take insurance coverage from any authorized Insurance Company against Workmen compensation due under Workmen Compensation Act and submit copy of the insurance document before issuance of work order**.** The eligible bidder shall ensure all safety measures during execution and repairs of the work. CREDA, will, in no case be responsible for any accident fatal or non-fatal, caused to any workman or outsider in course of transport or execution or repairs of work. All the expenditure including treatment or compensation will be entirely borne by the eligible bidder. The eligible bidder shall also be responsible for any claims of the workers including PF, Gratuity, ESI & other legal obligations.

NON-ASSIGNMENTS:

The eligible bidder shall not assign or transfer the work order issued as per this contract or any Part thereof without the prior approval of CREDA.

22. CERTIFICATES NOT TO AFFECT RIGHTS OF CREDA:

The issuance of any certificate by CREDA or any extension of time granted by CREDA shall not prejudice the rights of CREDA in terms of the contract nor shall they relieve the eligible bidder of his obligations for due performance of the contract.

23. SETTLEMENT OF DISPUTES THROUGH ARBITRATION:

i. Except as otherwise specifically provided in the contract, all disputes concerning questions of fact arising under the contract shall be decided by the Chief Executive Officer (CEO), CREDA provided a written appeal by the eligible bidder is made to CREDA. The decision of the CEO, CREDA shall be final and binding to the all concerns.

ii. Any dispute or difference including those considered as such by only of the Parties arising out of or in connection with the contract shall be to the extent possible be settled amicably between the Parties. If amicable settlement cannot be reached then all disputed issues shall be settled by arbitration.

24. LAWS GOVERNING CONTRACT:

The contract shall be constituted according to and subject to the Laws of India and jurisdiction of the High Court of Bilaspur, Chhattisgarh.

Compliance with Labour Regulations-During continuance of contract, the contractor (bidder) shall abide at all times by all applicable existing labour enactment and rules made there under, regulations, notifications and bylaws of state and central Govt or local authority that may be passed/issued or may be issued.

25. LANGUAGE AND MEASURES:

All documents pertaining to the Contract including specifications, schedules, notice correspondences, operating and maintenance instructions, drawings or any other writings shall be written in English / Hindi language. The metric system of measurement shall be used in this contract.

26. CORRESPONDENCE:

i. Any notice to the eligible bidder under the terms of the contract shall be served by registered mail to the registered office of the eligible bidder or by hand to the authorized local representative of the eligible bidder and copy by post to the eligible bidder 's principal place of business.

ii. Any notice to CREDA shall be served to the CEO, CREDA, Raipur in the same manner.

27. SECRECY:

The eligible bidder shall treat the details of the specifications and other documents as private and confidential and they shall not be reproduced without written authorization from CREDA.

28 AGREEMENT:

The successful eligible bidder shall have to enter into an agreement with the Chief Engineer, CREDA in the approved contract agreement form within 07 days of the receipt of call from CREDA.

29 BID EVALUATION CRITERIA:

a) Offer of only those bidders who are found qualifying based on Technical Evaluation Criteria will be taken into further consideration and price bids of only those qualifying Bidders will be opened.

b) CREDA retains right to negotiate rates or other terms with bidder quoted L-1.

c) Conditional bids shall not be accepted.

d) Work shall be awarded only to L1 eligible bidder including rate of maintenance for five years.

e) In case if there are more than one bidder who have quoted lowest price then the eligible bidder would be evaluated on the basis of following:

(i) Bid who had installed more Grid Connected Solar Power Plants in past than the minimum eligibility conditions of the bid.

(ii) If both the bidders are eligible with regard to point No (i) above then the bidder who has installed more numbers of higher capacities of Grid connected SPVPP would be preferred.

(iii) Decision of CREDA would be final and binding to all bidders in selection of eligible bidder based on above evaluation criteria.

30. EXTENSION IN SCOPE OF WORK:

If required, CREDA may offer the approved rate discovered through this bid (Rate to be calculated as per watt of the Grid Connected Solar System) to the eligible bidders of this bid, in case some other Grid Connected Solar Systems are to be installed in the vicinity of 50 K.M radius from site of this bid.

We / I (on behalf of Bidder) have read all the above stated details & accept to comply with it in total.

(Name, Signature & Seal of the Bidder)

SCOPE OF WORK

The scope of work in brief will be as follows-

1. Survey of site, designing, supply, installation & commissioning of SPV Power Plant systems as per site specific design and specifications approved by CREDA, on turnkey basis. Bidder shall have to take approval of the engineering documents, Bill of Materials and samples from CREDA prior to commencement of the work. Five years unconditional onsite warrantee for manufacturing defects shall be required for each of the system after successful commissioning and proper handing over.
2. The scope of work shall also includes the followings:

- Survey of Sites, Submission of site clearance certificate where the SPV Power Plants are to be installed. A layout plan of the site should also be submitted clearly indicating the identified location for installation of SPV Modules, Structures and other components are proposed to be installed. Work order shall be issued only after receipt of satisfactory reports regarding suitability of system installation. Bidder shall furnish all necessary information to beneficiary for SPV Power Plant Warrantee, Do & Don'ts etc. So as to avoid further misunderstandings and disputes.Brief details of site specific works are as below :-
  - **Construction work of parking shed with flooring work including supply of materials, fabrication, erection, installation and civil work as per site requirement at Pt. Deendayal Upadhyay Memorial Health Sciences & Ayush University, Uparwara, Nava Raipur Chhattisgarh. With prior approval from CREDA. (contact person for site Inspections Mr. Vaibhav Dubey (A.E) – 9340974943)**
  - **Design, supply, installation & commissioning of SPV Power Plant (SPVPP) of capacity 25 KWp with hot dip galvanized Elevated Module Mounting Structure as per requirement of the site for holding modules at C.G State Ware housing Corporation building ,Nava Raipur. (contact person for site Inspections Mr. Vaibhav Dubey (A.E) – 9340974943)**
  - **Design, supply, installation & commissioning of SPV Power Plant (SPVPP) of capacity 10 KWp as per requirement of site at 220KV Sub Station, MOPKA, Division C.S.P.T.C.L, Bilaspur. (contact person for site Inspections Mr.Alok Tiwari (A.E) – 8889031113)**
  - Detailed planning of time bound smooth execution of project.
  - Design, supply, installation & commissioning of SPV Power Plant of required capacities as per design and specifications approved by CREDA, on turnkey basis.
  - Get technical and safety clearances of proposed Grid Connected Roof Top SPVPP from the concerned CSPDCL office.
  - Co ordinate with beneficiary to get connectivity approval from CSPDCL and to synchronize the system with Grid in presence of CSPDCL and Concerned Officials.
  - Providing User Manuals and Warrantee Cards to beneficiary / CREDA.
  - Bidder shall have to submit JCCs within 15 days of Installation and Commissioning of SPV Power Plant in District Office of CREDA.
  - Unconditional onsite warrantee for manufacturing defects for Five years faultless operation, assure inventory for maintenance.
  - Providing Prompt Service Facilities to customers/ beneficiaries.
  - Risk liability of all personnel associated with implementation and realization of the project.
  - Training of at least two persons nominated by user, on the various aspects of design and maintenance of the offered system after commissioning of the system.
  - The eligible bidder shall maintain sufficient inventory of the spares to ensure that the system can be made functional within 7 days from the communication of breakdown of the system during currency of the warrantee period.
    The bidder shall run the system on trial basis and shall closely monitor the performance of the system before handing over the system, so that the assured annual power generation can be estimated for monitoring of the performance of the system. CREDA shall examine the data of generation and ascertain if the generation is adequate with reference to the capacity of the SPV Systems.
  - Performance Guarantee Test: Successful performance guarantee test to demonstrate The rated capacity of SPV Power Plant as per CREDA's norms shall have to be Conducted by bidder in presence of representatives of CREDA.

TECHNICAL SPECIFICATIONS

The proposed projects shall be commissioned as per following technical specifications.

DEFINITION :-

A Grid Tied Solar Rooftop Photovoltaic (SPV) power plant consists of SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter, and Controls & Protections, interconnect cables, Junction boxes, Distribution boxes and switches. PV Array is mounted on a suitable structure. Grid tied SPV system should be designed with necessary features to supplement the grid power during day time. Components and parts used in the SPV power plants including the PV modules, metallic structures, cables, junction box, switches, PCUs etc., should conform to the BIS or IEC or international specifications, wherever such specifications are available and applicable. Solar PV system shall consist of following equipments/components.

Solar PV modules consisting of required number of Crystalline PV cells.

- Grid interactive Power Conditioning Unit with Remote Monitoring System
- Mounting structures
- Junction Boxes.
- Earthing and lightening protections.
- IR/UV protected PVC Cables, pipes and accessories.

i. SOLAR PHOTOVOLTAIC MODULES :-

a) The PV modules used should be made in India.

b) The PV modules used must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards Crystalline Silicon Solar Cell Modules IEC 61215/IS14286. In addition, the modules must conform to IEC 61730 Part-1 - requirements for construction & Part 2 – requirements for testing, for safety qualification or equivalent IS.

c) For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701.

d) The total solar PV array capacity should not be less than allocated capacity (kWp) and should comprise of solar crystalline modules of minimum 300 Wp and above wattage. Module capacity less than minimum 300 watts shall not be accepted.

e) Protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided.

f) PV modules must be tested and approved by one of the IEC authorized test centres.

g) The module frame shall be made of corrosion resistant materials, preferably having anodized aluminium.

h) The Bidder shall carefully design & accommodate requisite numbers of the modules to achieve the rated power in his Bidder. CREDA shall allow only minor changes at the time of execution.

i) Other general requirement for the PV modules and subsystems shall be the Following:

- The rated output power of any supplied module shall have tolerance within +/- 3%.
- The peak-power point voltage and the peak-power point current of any supplied module and/or any module string (series connected modules) shall not vary by more than 2 (two) per cent from the respective arithmetic means for all modules and/or for all module strings, as the case may be.
- The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode. The box shall have hinged, weather proof lid with captive screws and cable gland entry points or may be of sealed type and IP-65 rated.
- I-V curves at STC should be provided by Bidder.

ii. SOLAR PV MODULES :-

All the modules should contain the following clear and indelible marking laminated inside the glass as per IS/ IEC 61730-1, clause 11.

I. Name, monogram or symbol of manufacturer;

II. Model number

III. Unique serial number

IV. Nominal wattage +-2%

V. Year and country of origin

VI. Brand name if applicable

Other details as per IS/IEC 61730-1 clause 11 should be provided at appropriate place. The actual Power Output P_{max} shall be mentioned on the label pasted on the back side of PV Module. In case of thin film modules information need not be provided laminated inside the glass, however, it should be provided as per IS/IEC 61730-1 clause 11 at an appropriate place with clear and indelible marking.

In addition to the above, the following information should also be provided

- Polarity of terminals or leads (colour coding is permissible) on junction Box housing near cable entry or cable and connector.
- The Maximum system voltage for which the module is suitable to be provided on the back sheet of the module.

iii. WARRANTIES :-

a) Material Warranty:
   a. Material Warranty is defined as: The project developer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (05) years from the date of sale to the original customer ("Customer")
   b. Defects and/or failures due to manufacturing
   c. Defects and/or failures due to quality of materials
   d. Non conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the project developer will repair or replace the solar module(s), at the Owners sole option.

b) Performance Warranty:
   The predicted electrical degradation of power generated not exceeding 20% of the minimum rated power over the 25 year period and not more than 10% after ten years period of the full rated original output.

iv. ARRAY STRUCTURE :-

a) Hot dip galvanized MS mounting structures may be used for mounting the modules / panels / arrays. Minimum thickness of galvanization should be at least 120 microns. Each structure should have angle of inclination as per the site conditions to take maximum insolation. However to accommodate more capacity the angle inclination may be reduced until the plant meets the specified performance ratio requirements.

b) The Mounting structure shall be so designed to withstand the speed for the wind zone of the location where a PV system is proposed to be installed (wind speed of 150 kM/ hour). It may be ensured that the design has been certified by a recognized Lab/ Institution in this regard and submit wind loading calculation sheet to CREDA. Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed.

c) The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759.

d) Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. **Aluminium structures also can be used which can withstand the wind speed of respective wind zone**. Necessary protection towards rusting need to be provided either by coating or anodization.

e) Aluminium frames should be avoided for installations in coastal areas.

f) The fasteners used should be made up of stainless steel. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels.

g) Regarding civil structures the Bidder need to take care of the load bearing capacity of the roof and need arrange suitable structures based on the quality of roof.

h) The total load of the structure (when installed with PV modules) on the terrace should be less than 60 kg/m^2.

i) The minimum clearance of the structure from the roof level should be 300 mm.

v. JUNCTION BOXES (JBs) :-

a) The junction boxes are to be provided in the PV array for termination of connecting cables. The J. Boxes (JBs) shall be made of GRP / FRP / Powder Coated Aluminium /cast aluminium alloy with full dust, water & vermin proof arrangement. All wires / cables must be terminated through cable lugs. The JBs shall be such that input & output termination can be made through suitable cable glands.

b) Copper bus bars / terminal blocks housed in the junction box with suitable termination threads Conforming to IP65 standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry. Single / double compression cable glands. Provision of earthings. It should be placed at 5 feet height or above for ease of accessibility.

c) Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) / SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups.

d) Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification.

e) All fuses shall have DIN rail mountable fuse holders and shall be housed in thermoplastic IP 65 enclosures with transparent covers.

vi. DC DISTRIBUTION BOARD :-

a) DC Distribution panel to receive the DC output from the array field.

b) DC DPBs shall have sheet from enclosure of dust & vermin proof conform to IP 65 protection. The bus bars are made of copper of desired size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors.

vii. AC DISTRIBUTION PANEL BOARD :-

a) AC Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter, and should have necessary surge arrestors. Interconnection from ACDB to mains at LT Bus bar while in grid tied mode.

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

c) The changeover switches, cabling work should be undertaken by the Bidder as part of the project.

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

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

f) All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better.

g) Should conform to Indian Electricity Act and rules (till last amendment).

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

Variation in supply voltage	+/- 10 %
Variation in supply frequency	+/- 3 Hz

- **PCU / ARRAY SIZE RATIO :-**

i) The combined wattage of all inverters should not be less than rated capacity of power plant under STC.

j) Maximum power point tracker shall be integrated in the PCU/inverter to maximize energy drawn from the array.

viii. PCU / INVERTER :-

a) As SPV array produce direct current electricity, it is necessary to convert this direct current into alternating current and adjust the voltage levels to match the grid voltage. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices. All these components of the system are termed the "Power Conditioning Unit (PCU)". In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter, to the power conditioning unit/inverter should also be DG set interactive. If necessary. Inverter output should be compatible with the grid frequency. Typical technical features of the inverter shall be as follows:

b)

Switching devices	IGBT/MOSFET
Control	Microprocessor /DSP
Nominal AC output voltage and frequency	415V, 3 Phase, 50 Hz (In case single phase inverters are offered, suitable arrangement for balancing the phases must be made.)
Output frequency	50 Hz
Grid Frequency Synchronization range	+ 3 Hz or more
Ambient temperature considered	-20° C to 50° C
Humidity	95 % Non-condensing
Protection of Enclosure	IP-20(Minimum) for indoor. IP-65(Minimum) for outdoor.
Grid Frequency Tolerance range	+ 3 or more
Grid Voltage tolerance	-0.20.15
No-load losses	Less than 1% of rated power
Inverter efficiency(minimum)	>93% (In case of 10 kW or above with in-built galvanic isolation) >97% (In case of 10 KW or above without in-built galvanic isolation)
Inverter efficiency (minimum)	> 90% (In case of less than 10 kW)
THD	< 3%
PF	> 0.9

a. Three phase PCU/ inverter shall be used with each power plant system (10kW and/or above) but in case of less than 10kW single phase inverter can be used.
b. PCU / inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown.
c. The output of power factor of PCU inverter is suitable for all voltage ranges or sink of reactive power, inverter should have internal protection arrangement against any sustainable fault in feeder line and against the lightning on feeder.
d. Built-in meter and data logger to monitor plant performance through external computer shall be provided.
e. **Anti-islanding** (Protection against Islanding of grid): The PCU shall have anti islanding protection in conformity to IEEE 1547/UL 1741/ IEC 62116 or equivalent BIS standard.
f. Successful bidders shall be responsible for galvanic isolation of solar roof top power plant (>100kW) with electrical grid or LT panel.
g. In PCU/Inverter, there shall be a direct current isolation provided at the output by means of a suitable isolating transformer. If Isolation Transformer is not incorporated with PCU/Inverter, there shall be a separate Isolation Transformer of suitable rating provided at the output side of PCU/PCU units for capacity more than 100 kW.
h. The PCU/ inverter generated harmonics, flicker, DC injection limits, Voltage Range, Frequency Range and Anti-Islanding measures at the point of connection to the utility services should follow the latest CEA (Technical Standards for Connectivity Distribution Generation Resources) Guidelines.
i. The power conditioning units / inverters should comply with applicable IEC/ equivalent BIS standard for efficiency measurements and environmental tests as per standard codes IEC 61683/IS 61683 and IEC 60068-2 (1,2,14,30)/ Equivalent BIS Std.
j. The MPPT units environmental testing should qualify IEC 60068-2 (1, 2, 14, 30)/ Equivalent BIS std. The junction boxes/ enclosures should be IP 65 (for outdoor)/ IP 54 (indoor) and as per IEC 529 specifications.
k. The PCU / inverters should be tested from the MNRE approved test centres / NABL / BIS / IEC accredited testing- calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses.

ix. INTEGRATION OF PV POWER WITH GRID :-

The output power from SPV would be fed to the inverters which converts DC produced by SPV array to AC and feeds it into the main electricity grid after synchronization. In case of grid failure, or low or high voltage, solar PV system shall be out of synchronization and shall be disconnected from the grid. Once the DG set comes into service, PV system shall again be synchronized with DG supply and load requirement would be met to the extent of availability of power. 4 pole isolation of inverter output with respect to the grid/ DG power connection need to be provided.

x. DATA ACQUISITION SYSTEM / PLANT MONITORING :-

a) Data Acquisition System shall be provided for each of the solar PV plant above 10 kWp capacity.
b) Data Logging Provision for plant control and monitoring, time and date stamped system data logs for analysis with the high quality, suitable PC. Metering and Instrumentation for display of systems parameters and status indication to be provided.
c) Temperature: Temperature probes for recording the Solar panel temperature and/or ambient temperature to be provided complete with readouts integrated with the data logging system.
d) The following parameters are accessible via the operating interface display in real time separately for solar power plant:
   a. AC Voltage.

b. AC Output current.
c. Output Power
d. Power factor.
e. DC Input Voltage.
f. DC Input Current.
g. Time Active.
h. Time disabled.
i. Time Idle.
j. Power produced
k. Protective function limits (Viz-AC Over voltage, AC Under voltage, over frequency, Under frequency ground fault, PV starting voltage, PV stopping voltage.

e) All major parameters available on the digital bus and logging facility for energy auditing through the internal microprocessor and read on the digital front panel at any time) and logging facility (the current values, previous values for up to a month and the average values) should be made available for energy auditing through the internal microprocessor and should be read on the digital front panel.

f) PV array energy production: Digital Energy Meters to log the actual value of AC/ DC voltage, Current & Energy generated by the PV system provided. Energy meter along with CT/PT should be of 0.5 accuracy class.

g) Computerized DC String/Array monitoring and AC output monitoring shall be provided as part of the inverter and/or string/array combiner box or separately.

h) String and array DC Voltage, Current and Power, Inverter AC output voltage and current (All 3 phases and lines), AC power (Active, Reactive and Apparent), Power Factor and AC energy (All 3 phases and cumulative) and frequency shall be monitored.

i) Computerized AC energy monitoring shall be in addition to the digital AC energy meter.

j) The data shall be recorded in a common work sheet chronologically date wise. The data file shall be MS Excel compatible. The data shall be represented in both tabular and graphical form.

k) All instantaneous data shall be shown on the computer screen.

l) Software shall be provided for USB download and analysis of DC and AC parametric data for individual plant.

m) Provision for instantaneous Internet monitoring and download of historical data shall be also incorporated.

n) Remote Server and Software for centralized Internet monitoring system shall be also provided for download and analysis of cumulative data of all the plants and the data of the solar radiation and temperature monitoring system.

o) Ambient/Solar PV module back surface temperature shall be also monitored on continuous basis.

p) Simultaneous monitoring of DC and AC electrical voltage, current, power, energy and other data of the plant for correlation with solar and environment data shall be provided.

q) Remote Monitoring and data acquisition through Remote Monitoring System software at the CREDA location with latest software/hardware configuration and service connectivity for online / real time data monitoring / control complete to be supplied and operation and maintenance / control to be ensured by the Bidder.

r) The Bidder shall be obligated to push real-time plant monitoring data on a specified intervals (say 15 minute) through open protocol at receiver location (cloud server) in XML/JSON format, preferably. Suitable provision in this regard will be intimated to the Bidder.

xi. <u>TRANSFORMER "IF REQUIRED" & METERING :-</u>

a) Dry/oil type relevant kVA, 11kV/415V, 50 Hz Step up along with all protections, switchgears, Vacuum circuit breakers, cables etc. along with required civil work.

b) The Bi-directional electronic energy meter (0.5 S class) shall be installed for the measurement of import/Export of energy.

c) The Bidder must take approval/NOC from the Concerned DISCOM for the connectivity, technical feasibility, and synchronization of SPV plant with distribution network before

commissioning of SPV plant.

d) Reverse power relay shall be provided by Bidder (if necessary), as per the local DISCOM requirement.

xii. POWER CONSUMPTION:

Regarding the generated power consumption, priority need to give for internal consumption first and thereafter any excess power can be exported to grid. Decisions of appropriate authority like DISCOM, state regulator may be followed.

xiii. PROTECTIONS :-

The system should be provided with all necessary protections like earthing, Lightning, and grid islanding as follows:

i. LIGHTNING PROTECTION :-

The SPV power plants shall be provided with lightning &overvoltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc The entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors. Lightning protection should be provided as per IEC 62305 standards. The protection against induced high-voltages shall be provided by the use of metal oxide varistors (MOVs) and suitable earthing such that induced transients find an alternate route to earth.

ii. SURGE PROTECTION :-

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

iii. EARTHING PROTECTION :-

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

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

iv. GRID ISLANDING :-

a) In the event of a power failure on the electric grid, it is required that any independent power-producing inverters attached to the grid turn off in a short period of time. This prevents the DC-to-AC inverters from continuing to feed power into small sections of the grid, known as “Islands.” Powered Islands present a risk to workers who may expect the area to be unpowered, and they may also damage grid-tied equipment. The Rooftop PV system shall be equipped with islanding protection. In addition to disconnection from the grid (due to islanding protection) disconnection due to under and over voltage conditions shall also be provided.

b) A manual disconnect 4-pole isolation switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personnel to carry out any maintenance. This switch shall be locked by the utility personnel.

xiv. CABLES :-

Cables of appropriate size to be used in the system shall have the following characteristics:

a. Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards
b. Temp. Range: –10°C to +80°C.
c. Voltage rating 660/1000V
d. Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
e. Flexible
f. Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum (2%)

g. For the DC cabling, XLPE or, XLPO insulated and sheathed, UV- stabilized single core multi-stranded flexible copper cables shall be used; Multi-core cables shall not be used.

h. For the AC cabling, PVC or, XLPE insulated and PVC sheathed single or, multi-core multi-stranded flexible copper cables shall be used; Outdoor AC cables shall have a UV-stabilized outer sheath.

i. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use. Outer sheath of cables shall be electron beam cross-linked XLPO type and black in colour.

j. The DC cables from the SPV module array shall run through a UV- stabilized PVC conduit pipe of adequate diameter with a minimum wall thickness of 1.5mm.

k. Cables and wires used for the interconnection of solar PV modules shall be provided with solar PV connectors (MC4) and couplers.

l. All cables and conduit pipes shall be clamped to the rooftop, walls and ceilings with thermo-plastic clamps at intervals not exceeding 50 cm; the minimum DC cable size shall be 4.0 mm^2 copper; the minimum AC cable size shall be 4.0 mm2 copper. In three phase systems, the size of the neutral wire size shall be equal to the size of the phase wires.

m. Cable Routing / Marking: All cable/wires are to be routed in a GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable easily identified. In addition, cable drum no. / Batch no. to be embossed/ printed at every one meter.

n. Cable Jacket should also be electron beam cross-linked XLPO, flame retardant, UV resistant and black in colour.

o. 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, salt, burial and attack by moss and microbes for 25 years and voltages as per latest IEC standards. DC cables used from solar modules to array junction box shall be solar grade copper (Cu) with XLPO insulation and rated for 1.1kV as per relevant standards only.

p. The ratings given are approximate. Bidder to indicate size and length as per system design requirement. All the cables required for the plant shall be provided by the Bidder. Any change in cabling sizes if desired by the Bidder shall be approved after citing appropriate reasons. All cable schedules/ layout drawings shall be approved prior to installation.

q. Multi Strand, Annealed high conductivity copper conductor PVC type 'A' pressure extruded insulation or XLPE insulation. Overall PVC/XLPE insulation for UV protection Armoured cable for underground laying. All cable trays including covers to be provided. All cables conform to latest edition of IEC/ equivalent BIS Standards as specified below: BoS item / component Standard Description Standard Number Cables General Test and Measuring Methods, PVC/XLPE insulated cables for working Voltage up to and including 1100 V, UV resistant for outdoor installation IS /IEC 69947.

r. The total voltage drop on the cable segments from the solar PV modules to the solar grid inverter shall not exceed 2.0%.

s. The total voltage drop on the cable segments from the solar grid inverter to the building distribution board shall not exceed 2.0%.

xv. CONNECTIVITY :-

The maximum capacity for interconnection with the grid at a specific voltage level shall be as specified in the Distribution Code/Supply Code of the State and amended from time to time. Following criteria have been suggested for selection of voltage level in the distribution system for ready reference of the solar suppliers.

Plant Capacity	**Connecting voltage**
Up to 10 kW	240V-single phase or 415V-three phase at the option of the consumer
Above 10kW and up to 100 kW	415V – three phase
Above 100kW	At HT/EHT level (11kV/33kV/66kV) as per DISCOM rules

xvi. TOOLS & TACKLES AND SPARES :-

a) After completion of installation & commissioning of the power plant, necessary tools & tackles are to be provided free of cost by the Bidder for maintenance purpose. List of tools and tackles to be supplied by the Bidder for approval of specifications and make from CREDA.

b) A list of requisite spares in case of PCU/inverter comprising of a set of control logic cards, IGBT driver cards etc. Junction Boxes. Fuses, MOVs / arrestors, MCCBs etc along with spare set of PV modules be indicated, which shall be supplied along with the equipment. A minimum set of spares shall be maintained in the plant itself for the entire period of warranty and Operation & Maintenance which upon its use shall be replenished.

xvii. DANGER BOARDS AND SIGNAGES :-

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

xviii. FIRE EXTINGUISHERS :-

The fire fighting system for the proposed power plant for fire protection shall be consisting of:

a. Portable fire extinguishers in the control room for fire caused by electrical short circuits.
b. Sand buckets in the control room.
c. The installation of Fire Extinguishers should confirm to TAC regulations and BIS standards. The fire extinguishers shall be provided in the control room housing PCUs as well as on the Roof or site where the PV arrays have been installed.

xix. DRAWINGS & MANUALS :-

a) Two sets of Engineering, electrical drawings and Installation and O&M manuals are to be supplied. Bidder shall provide complete technical data sheets for each equipment giving details of the specifications along with make/makes in their Bidder along with basic design of the power plant and power evacuation, synchronization along with protection equipment.
b) Approved ISI and reputed makes for equipment be used.
c) For complete electro-mechanical works, Bidder shall supply complete design, details and drawings for approval to CREDA before progressing with the installation work.

xx. PLANNING AND DESIGNING:

The Bidder should carry out Shadow Analysis at the site and accordingly design strings & arrays layout considering optimal usage of space, material and labour. The Bidder should submit the array layout drawings along with Shadow Analysis Report to CREDA for approval.

xxi. DRAWINGS TO BE FURNISHED BY CHANNEL PARTNER AFTER AWARD OF CONTRACT FROM BENEFICIARY:-

a) The Contractor shall furnish the following drawings Award/Intent and obtain approval.
b) General arrangement and dimensioned layout.
c) Schematic drawing showing the requirement of SV panel, Power conditioning Unit(s)/ inverter, Junction Boxes, AC and DC Distribution Boards, meters etc.
d) Structural drawing along with foundation details for the structure.
e) Itemized bill of material for complete SPV plant covering all the components and associated accessories.
f) Layout of solar Power Array.
g) Shadow analysis of the roof.

xxii. SOLAR PV SYSTEM ON THE ROOFTOP FOR MEETING THE ANNUAL ENERGY REQUIREMENT:-

The Solar PV system on the rooftop of the selected buildings will be installed for meeting upto 90% of the annual energy requirements depending upon the area of rooftop available and the remaining energy requirement of the buildings will be met by drawing power from grid at commercial tariff of DISCOMs.

xxiii. SAFETY MEASURES :-

The Bidder shall take entire responsibility for electrical safety of the installation(s) including connectivity with the grid and follow all the safety rules & regulations applicable as per Electricity Act, 2003 and CEA guidelines etc.

xxiv. DISPLAY BOARD :-

The Bidder has to display a board at the project site (above 10 kWp) mentioning the Following :-

a. Plant Name, Capacity, Location, Type of Renewable Energy plant (Like solar wind etc.), Date of commissioning, details of tie-up with transmission and distribution companies, Power generation and Export FY wise.
b. Financial Assistance details from CREDA/MNRE/Any other financial institution apart from loan. This information shall not be limited to project site but also be displayed at site offices/head quarter offices of the successful Bidder.
c. The size and type of board and display shall be appropriate.

Quality Certification, Standards and Testing for Grid-connected Rooftop Solar PV Systems/Power Plants

Quality certification and standards for grid-connected rooftop solar PV systems are essential for the successful mass-scale implementation of this technology. It is also imperative to put in place an efficient and rigorous monitoring mechanism, adherence to these standards. Hence, all components of grid-connected rooftop solar PV system/ plant must conform to the relevant standards and certifications given below:

Solar PV Modules/Panels	
IEC 61215/ IS14286	Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
IEC 61701	Salt Mist Corrosion Testing of Photovoltaic (PV) Modules
IEC 61853- Part 1/ IS 16170: Part 1	Photovoltaic (PV) module performance testing and energy rating –: Irradiance and temperature performance measurements, and power
IEC 62716	Photovoltaic (PV) Modules – Ammonia (NH3) Corrosion Testing (As per the site condition like dairies, toilets)
IEC 61730-1,2	Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements for Construction, Part 2: Requirements for Testing
IEC 62804	Photovoltaic (PV) modules - Test methods for the detection of Potential-induced degradation. IEC TS 62804-1: Part 1: Crystalline silicon (mandatory for applications where the system voltage is >600 VDC and advisory for installations where the
IEC 62759-1	Photovoltaic (PV) modules – Transportation testing, Part 1: Transportation and shipping of module package units

Solar PV Inverters	
IEC 62109-1, IEC 62109-2	Safety of power converters for use in photovoltaic power systems – Part 1: General requirements, and Safety of power converters
	for use in photovoltaic power systems Part 2: Particular requirements for inverters. Safety compliance (Protection degree IP 65 for outdoor mounting, IP 54 for indoor mounting)
IEC/IS 61683 (as applicable)	Photovoltaic Systems – Power conditioners: Procedure for Measuring Efficiency (10%, 25%, 50%, 75% & 90-100% Loading Conditions)
BS EN 50530 (as applicable)	Overall efficiency of grid-connected photovoltaic inverters: This European Standard provides a procedure for the measurement of the accuracy of the maximum power point tracking (MPPT) of inverters, which are used in grid-connected photovoltaic systems. In that case the inverter energizes a low voltage grid of stable AC voltage and constant frequency. Both the static and dynamic MPPT
IEC 62116/ UL 1741/ IEEE 1547 (as	Utility-interconnected Photovoltaic Inverters - Test Procedure of Islanding Prevention Measures
IEC 60255-27	Measuring relays and protection equipment – Part 27: Product safety requirements
IEC 60068-2 (1, 2, 14, 27, 30 & 64)	Environmental Testing of PV System – Power Conditioners and Inverters a) IEC 60068-2-1: Environmental testing - Part 2-1: Tests - Test A: Cold b) IEC 60068-2-2: Environmental testing - Part 2-2: Tests - Test B: Dry heat c) IEC 60068-2-14: Environmental testing - Part 2-14: Tests - Test N: Change of temperature d) IEC 60068-2-27: Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock e) IEC 60068-2-30: Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle) f) IEC 60068-2-64: Environmental testing - Part 2-64: Tests -
IEC 61000 – 2,3,5 (as applicable)	Electromagnetic Interference (EMI) and Electromagnetic Compatibility (EMC) testing of PV Inverters

Fuses	
IS/IEC 60947 (Part 1, 2 & 3), EN 50521	General safety requirements for connectors, switches, circuit breakers (AC/DC): a) Low-voltage Switchgear and Control-gear, Part 1: General rules b) Low-Voltage Switchgear and Control-gear, Part 2: Circuit Breakers c) Low-voltage switchgear and Control-gear, Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units d) EN 50521: Connectors for photovoltaic systems – Safety requirements and tests
IEC 60269-6	Low-voltage fuses - Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems
Surge Arrestors	
IEC 62305-4	Lightening Protection Standard
IEC 60364-5-53/ IS 15086-5 (SPD)	Electrical installations of buildings - Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control
IEC 61643-11:2011	Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods
Cables	
IEC 60227/IS 694, IEC 60502/IS 1554 (Part 1 & 2)/ IEC69947	General test and measuring method for PVC (Polyvinyl chloride) insulated cables (for working voltages up to and including 1100 V, and UV resistant for outdoor installation)
BS EN 50618	Electric cables for photovoltaic systems (BT(DE/NOT)258), mainly for DC Cables

Earthing /Lightning	
IEC 62561 Series (Chemical earthing)	IEC 62561-1 Lightning protection system components (LPSC) - Part 1: Requirements for connection components IEC 62561-2 Lightning protection system components (LPSC) - Part 2: Requirements for conductors and earth electrodes IEC 62561-7 Lightning protection system components (LPSC) - Part 7: Requirements for earthing enhancing compounds
Junction Boxes	
IEC 60529	Junction boxes and solar panel terminal boxes shall be of the thermo-plastic type with IP 65 protection for outdoor use, and IP 54 protection for indoor use
Energy Meter	
IS 16444 or as specified by the DISCOMs	A.C. Static direct connected watt-hour Smart Meter Class 1 and 2 — Specification (with Import & Export/Net energy measurements)
Solar PV Roof Mounting Structure	
IS 2062/IS 4759	Material for the structure mounting

Note- Equivalent standards may be used for different system components of the plants. In case of clarification following person/agencies may be contacted.

- Ministry of New and Renewable Energy (Govt. of India)
- National Institute of Solar Energy
- The Energy & Resources Institute
- TUV Rheinland
- UL

Comprehensive Maintenance Guidelines of Grid Connected PV Plants

TO BE MANDATORILY FOLLOWED BY BIDDER

For the optimal operation of a PV plant, maintenance must be carried out on a regular basis. All the components should be kept clean. It should be ensured that all the components are fastened well at their due place. Maintenance guidelines for various components viz. solar panels, inverter, wiring etc. are discussed below. The Comprehensive Maintenance of Solar Photovoltaic Power Plant would include wear, tear, overhauling, machine breakdown, insurance, and replacement of defective modules, invertors / Power Conditioning Unit (PCU) spares, consumables & other Part for a period of 5 years systems.

The bidder shall be responsible for all the required activities for successful Comprehensive maintenance of the Rooftop Solar PV system for a period of 5 years.

- Comprehensive Maintenance of Solar Power Plant shall be compliant with grid requirements to achieve committed energy generation.
- **Arrangement of qualified and experienced engineer/ technicians till the Comprehensive Maintenance period for projects.**
- Periodic cleaning of solar modules.
- Periodic checks of the Modules, PCUs and BoS shall be carried out as a Part of routine preventive and breakdown maintenance.
- Immediate replacement of defective Modules, Invertors/PCUs and other equipment as and when required.
- Supply of all spares, consumables and fixtures as required. Such stock shall be maintained for all associated equipments and materials as per manufacturer/ supplier's recommendations.
- The entire equipment testing instrument required for Testing, Commissioning and Comprehensive Maintenance for the healthy operation of the Plant shall be maintained by the Bidder. The testing equipments must be calibrated once every 2 years from NABL accredited labs and the certificate of calibration must be kept for reference as required.
- If negligence/ mal-operation on Part of the Bidder's operator results in failure of equipment, such equipment should be repaired/ replaced by the Bidder free of cost.
- Co-ordination with Beneficiaries/DISCOM as per the requirement for Joint Metering Report (JMR). The person in charge present at site from bidder's side shall take a joint meter reading in the presence of rooftop owner on a **monthly basis**. Furnishing generation data (JMR) each month to CREDA positively by 1st week of every month for the previous month. Failure to adhere may result in non-disbursal of subsidy.
- Online Performance Monitoring, controlling, troubleshooting, maintaining of logs & records. A maintenance record register is to be maintained by the operator with effect from Commissioning to record the daily generation on monthly basis, regular maintenance work carried out as well as any preventive and breakdown maintenance along with the date of maintenance, reasons for the breakdown, duration of the breakdown, steps taken to attend the breakdown, etc.
- For any issues related to Comprehensive maintenance, a toll-free number shall be made available to the rooftop owner/ plant owner to **attend** within 72 hours. If not attended within such stipulated time, a complaint may be raised to CREDA, pursuant to which, a penalty of Rs. 10,000 for full month

or more shall be imposed for a system capacity above 100 kWp. This will be applicable till 5 years of Comprehensive Maintenance as per the Scope of the bid.

- If any jobs covered in Comprehensive Maintenance Scope as per bid are not carried out by the Bidder during the Comprehensive Maintenance period, the Engineer-In-Charge shall take appropriate action as deemed fit. CREDA reserves the right to make surprise checks/ inspection visits at its own or through authorized representative to verify the Comprehensive Maintenance activities being carried out by the Bidder. Failure to adhere to above guidelines will result in penal action including debarring from Participation in next bid.
- if a system is non operational for more than seven days than warrantee period shall extend for the period in which system is non operational

METERING AND GRID CONNECTIVITY

Metering and grid connectivity of the roof top solar PV system under this scheme would be the responsibility of the Bidder in accordance with the prevailing guidelines of the concerned DISCOM and / or CEA (if available by the time of implementation). CREDA could facilitate connectivity; however, the entire responsibility lies with bidder only.

PLANT PERFORMANCE EVALUATION

Average CUF of 15% annually should be maintained for a period of 5 years. The bidder should send the monthly plant output details to CREDA for ensuring the CUF in prescribed format along with the reading of import and export measured through the CSPDCL Consumer Energy Meter.

PROGRESS REPORT

The bidder shall submit the progress report monthly to **CREDA** in Prescribed Performa. **If the monthly generation report is not received regularly for more than three months in continuation than the Bidder shall be proposed for black listing for at least two years or for the period as decided by CREDA**. CREDA will have the right to depute it's representatives to ascertain the progress of contract at the premises of works of the bidder.

Submission of Comprehensive Maintenance Report (CMR)

The bidder shall submit the Monthly Comprehensive Maintenance Report mandatorily to CREDA as per the Format enclosed at **Annexure A, every month**. Non submission of the report shall be considered as "Breach of Contract" and shall attract punitive actions as per the relevant provisions of the Contract including non-release of subsidy. However, the decision of Engineer–in -charge shall be final in this regard.

1. SOLAR PANELS

- The panels are to be cleaned at least once every fifteen days.
- Any bird droppings or spots should be cleaned immediately.
- Use water and a soft sponge or cloth for cleaning.
- Do not use detergent or any abrasive material for panel cleaning.
- Iso-propyl alcohol may be used to remove oil or grease stains.
- Do not spray water on the panel if the panel glass is cracked or the back side is perforated.
- Wipe water from module as soon as possible.

- Use proper safety belts while cleaning modules at inclined roofs etc.
- The modules should not be cleaned when they are excessively hot. Early morning is particularly good time for module cleaning?
- Check if there are any shade problems due to vegetation or new building. If there are, make arrangements for removing the vegetation or moving the panels to a shade-free place.
- Ensure that the module terminal connections are not exposed while cleaning; this poses a risk of electric shock.
- Never use panels for any unintended use, e. g. drying clothes, chips etc.
- Ensure that monkeys or other animals do not damage the panels.

2. CABLES AND CONNECTION BOXES

- Check the connections for corrosion and tightness.
- Check the connection box to make sure that the wires are tight, and the water seals are not damaged.
- There should be no vermin inside the box.
- Check the cable insulating sheath for cracks, breaks or burns. If the insulation is damaged, replace the wire.
- If the wire is outside the building, use wire with weather-resistant insulation.
- Make sure that the wire is clamped properly and that it should not rub against any sharp edges or corners.
- If some wire needs to be changed, make sure it is of proper rating and type.

3. INVERTER

- The inverter should be installed in a clean, dry, and ventilated area which is separated from, and not directly above, the battery bank.
- Remove any excess dust in heat sinks and ventilations. This should only be done with a dry cloth or brush.
- Check that vermin have not infested the inverter. Typical signs of this include spider webs on ventilation grills or wasps' nests in heat sinks.
- Check functionality, e.g. automatic disconnection upon loss of grid power supply, at least once a month.
- Verify the state of DC/AC surge arrestors, cable connections, and circuit breakers.

4. SHUTTING DOWN THE SYSTEM

- Disconnect system from all power sources in accordance with instructions for all other components used in the system.
- Completely cover system modules with an opaque material to prevent electricity from being generated while disconnecting conductors.
- To the extent possible, system shutdown will not be done during day time or peak generation.

INSPECTION AND MAINTENANCE SCHEDULE

Component	Activity	Description	Interval	By
PV Module	Cleaning	Clean of bird droppings/dark spots on modules.	Immediately	User/ Technician
	Cleaning	Clean PV modules with plain water or mild dish washing detergent. Do not use brushes, any type of solvents, abrasive, or harsh detergents.	Fortnightly or as per the site conditions.	User/ Technician
	Inspections for plants >100 KWp	Use infrared camera to inspect for hot spots; bypass diode failure	Annual	Technician

Component	Activity	Description	Interval	By
PV Array	Inspection	Check PV Module and rack for any damage note down location and serial no. of damaged modules	Annual	User/ Technician
	Inspection	Determine if any new object such as a vegetation growth are causing shading of the array and move them if possible.	Annual	User/ Technician
	Vermin removal	Remove bird nests or vermin from array and rack area	Annual	User/ Technician
Junction Boxes	Inspection	Inspect electrical boxes for corrosion or intrusion of water or insects. Seal boxes is required. Check position of switches and breakers. Check operation of all protection devices.	Annual	Electrician
Wiring	Inspection	Inspect cabling for signs of cracks, defects, loose connections, overheating, arching, short or open circuits, and ground faults.	Annual	Electrician
Inverter	Inspection	Observe	Monthly	Electrician

Annexure A

Monthly Comprehensive Maintenance Report Format

Month and year:

Name of the System Integrator:

Project Capacity:

Address of the site:

Part A*Provide details of any replacement of systems/components, damages, plant/inverter shut down (planned/forced), breakdown, etc under remarks.

*Register is to be maintained by the system integrator at each location where solar power plant of all the sites mentioned in this bid. The same may be inspected by CREDA or its authorised representative at any time during 5 years of Comprehensive Maintenance period. The Register will have the information about the generation, Inverter downtime if any, Grid outages etc.

Monthly Comprehensive Maintenance Report

Month and year:

Name of the System Integrator:

Project

Capacity:

Name of the

site: Part A

Component	Activity	Description	Date	Name / Signature	*Remarks
PV Module	Cleaning	Immediately clean any bird droppings/ dark spots on module.			
	Cleaning	Clean PV modules with plain water or mild dishwashing detergent.			
	Inspection (for plants > 100 kWp)	Infrared camera inspection for hot spots; bypass diode failure.			
PV Array	Inspection	Check the PV modules and rack for any damage.			
	Inspection	If any new objects, Such as vegetation growth etc., are causing shading of the array. Remove if any.			
	Vermin Removal	Remove bird nests or Vermin from array and rack area.			
Junction Boxes	Inspection	• Inspect electrical boxes for corrosion, intrusion of water or vermin. • Check position of switches and Breakers. • Check status of all protection devices.			
Wiring	Inspection	Inspect cabling for signs of cracks, defects, lose connections, corrosion,			

Component	Activity	Description	Date	Name / Signature	*Remarks
		overheating, arcing, Short or open circuits, and ground faults.			
Inverter	Inspection	• Observe instantaneous operational indicators on the faceplate. • Inspect Inverter housing or shelter for Any physical maintenance. • Check for connection tightness.			
Inverter	Service	Clean or replace any air filters.			
Instruments	Validation	Verify monitoring Instruments (pyranometer etc.) with standard instruments to verify their operation within tolerance limits.			
Transformer	Inspection	Inspect transformer oil level, temperature gauges, breather, silica gel, meter, connections etc.			
Plant	Monitoring	Daily Operation and Performance Monitoring.			
Spare Part	Management	Manage inventory of Spare Part.			
Log Book	Documentation	Maintain daily log Records.			
Tracker (if any)	Inspection	Inspect gears, gear Boxes, bearings, motors.			
	Service	Lubricate bearings, gear as required.			

*****Provide details of any replacement of systems/components, damages, plant/inverter shut down (planned/forced), breakdown, etc under remarks.

*Daily register is to be maintained by the bidder at each location greater than 50 kWp. The same may be inspected by CREDA or its authorised representative at any time 5 years of Comprehensive Maintenance period. The Register will have the information about the daily generation, Inverter downtime if any, Grid outages.

Part B

Date of Month	Generation in KWh	Grid outage (hh:mm)	Inverter down period (hh:mm)	Remarks
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				

Total generation for the month in kWh:
Cumulative generation since commissioning in kWh:
CUF for month in %:
Cumulative CUF since commissioning in %:
Date:

(Name:_____)

Signature of the Authorised signatory of the System Integrator **(Name:_____)**
Signature of the Authorised signatory of the Beneficiary

Format for Solar Generation Reading

Table[i]					
Solar Generation					
SN	**Previous Month reading**	**Current Month Reading**	**Total Reading(3-2)**	**MF**	**Total Generation KWh (A)= (4*5)**
1	2	3	4	5	6
Table[j]					
Solar Power Exported to CSPDCL Grid					
SN	**Previous Month reading**	**Current Month Reading**	**Total Reading(3-2)**	**MF**	**Total export power in KWh (B)=(4*5)**
1	2	3	4	5	6
Table[k]					
Power Imported from CSPDCL Grid					
SN	**Previous Month reading**	**Current Month Reading**	**Total Reading(3-2)**	**MF**	**Total import power in KWh (C)=(4*5)**
1	2	3	4	5	6

Exported KWh% of Total Generation (B/A)*100:-

Solar Power Utilized by Beneficiary in KWh (A-B) :-

% of Solar Power Utilized by Beneficiary [(A-B)/A]*100:-

Total Power Consumption of Beneficiary (A-B+C):-

Remark if any

PRICE BID

Name of Site:- 220KV Sub Station, MOPKA, Bilaspur 10 KW SPVPP

Schedule of Rates for SPV Power Plant Systems

*As per Specifications & Scope of Work of BID DOCUMENT No.**19508**/CREDA/Raipur/SPVPP-ON GRID/Dtd. **27.02.2020***

Design, Manufacturing, Supply, Erection, Testing & Commissioning & maintenance for a period of 5 years including Power Evacuation System and cost of replacement of all the Part, covered under Guarantee period for a period of 5 years from the date of commissioning of Roof top Solar PV system.

S.No	Particulars	Cost for total 10 KWp (rate rounded off to nearest thousand) in Rs.	Applicable GST		Total Cost inclusive of GST mentioned on column E in Rs.
			% of GST	in Amount Rs.	
A	B	C	D		E
1	Cost of Supply of system				
2	Cost of Installation and Commissioning				
3	Cost of 5years Maintenance*				
4	Total Project Cost **(1+2+3)** in Rs. **				

Note:-*CMC price cannot be less than 8% of total Project Cost (Total cost mentioned in Row "1" and "2")

****L1 bidder would be compared based on the total project cost mentioned in Column E**

Name of the authorized Signatory:

Signature of the Authorized Signatory:

Seal of Company:

Date:

PRICE BID

Name of Site :- Chhattisgarh State Warehousing Corporation Building, Sector-24, Nava Raipur, 25 KW SPVPP.

Schedule of Rates for SPV Power Plant Systems

*As per Specifications & Scope of Work of BID DOCUMENT No.**19508**/CREDA/Raipur/SPVPP-ON GRID/Dtd.**27.02.2020.***

Design, Manufacturing, Supply, Erection, Testing & Commissioning & maintenance for a period of 5 years including Power Evacuation System and cost of replacement of all the Part, covered under Guarantee period for a period of 5 years from the date of commissioning of Roof top Solar PV system.

S.No	Particulars	Cost for total 25 KWp (rate rounded off to nearest thousand) in Rs.	Applicable GST		Total Cost inclusive of GST mentioned on column E in Rs.
			% of GST	in Amount Rs.	
A	B	C	D		E
1	Cost of Supply of system				
2	Cost of Installation and Commissioning				
3	Cost of 5years Maintenance*				
4	Total Project Cost **(1+2+3)** in Rs. **				

Note:-*CMC price cannot be less than 8% of total Project Cost (Total cost mentioned in Row "1" and "2")

****L1 bidder would be compared based on the total project cost mentioned in Column E.**

Name of the authorized Signatory:

Signature of the Authorized Signatory:

Seal of Company:

Date:

PRICE BID

Name of Site:- Pt. Deendayal Upadhaya Memorial Health Science & Ayush University, Uparwara, Nava Raipur (on Parking Shed) 70 KW SPVPP

Schedule of Rates for SPV Power Plant Systems

*As per Specifications & Scope of Work of BID DOCUMENT No.**19508**/CREDA/Raipur/SPVPP-ON GRID/Dtd**. 27.02.2020***

Design, Manufacturing, Supply, Erection, Testing & Commissioning & maintenance for a period of 5 years including Power Evacuation System and cost of replacement of all the Part, covered under Guarantee period for a period of 5 years from the date of commissioning of Roof top Solar PV system.

S.No	Particulars	Cost for total 70 KWp (rate rounded off to nearest thousand) in Rs.	Applicable GST		Total Cost inclusive of GST mentioned on column E in Rs.
			% of GST	in Amount Rs.	
A	B	C	D		E
1	Cost of Supply of system				
2	Cost of Installation and Commissioning				
3	Cost of 5years Maintenance*				
4	Total Project Cost **(1+2+3)** in Rs. **				

Note:-*CMC price cannot be less than 8% of total Project Cost (Total cost mentioned in Row "1" and "2")

****L1 bidder would be compared based on the total project cost mentioned in Column E.**

Name of the authorized Signatory:

Signature of the Authorized Signatory:

Seal of Company:

Date:

Annexure-"B"

1. It is hereby certified that my firm..... is registered with CREDA as System Integrator under Category B/C.

Seal and Signature of Authorized Signatory.

OR

We hereby submit our undertaking that

2. Presently we are not registered with CREDA as System Integrator under Category "B" or "C"

And

3. We have read and understood all the terms and conditions of CREDA registration

And

4. Accordingly we meet all the eligibility criteria of registration as System Integrator in 2019-20.

And

5. We shall get registered as System Integrator under Category "B" or "C" if we are the lowest bidder in.....

And

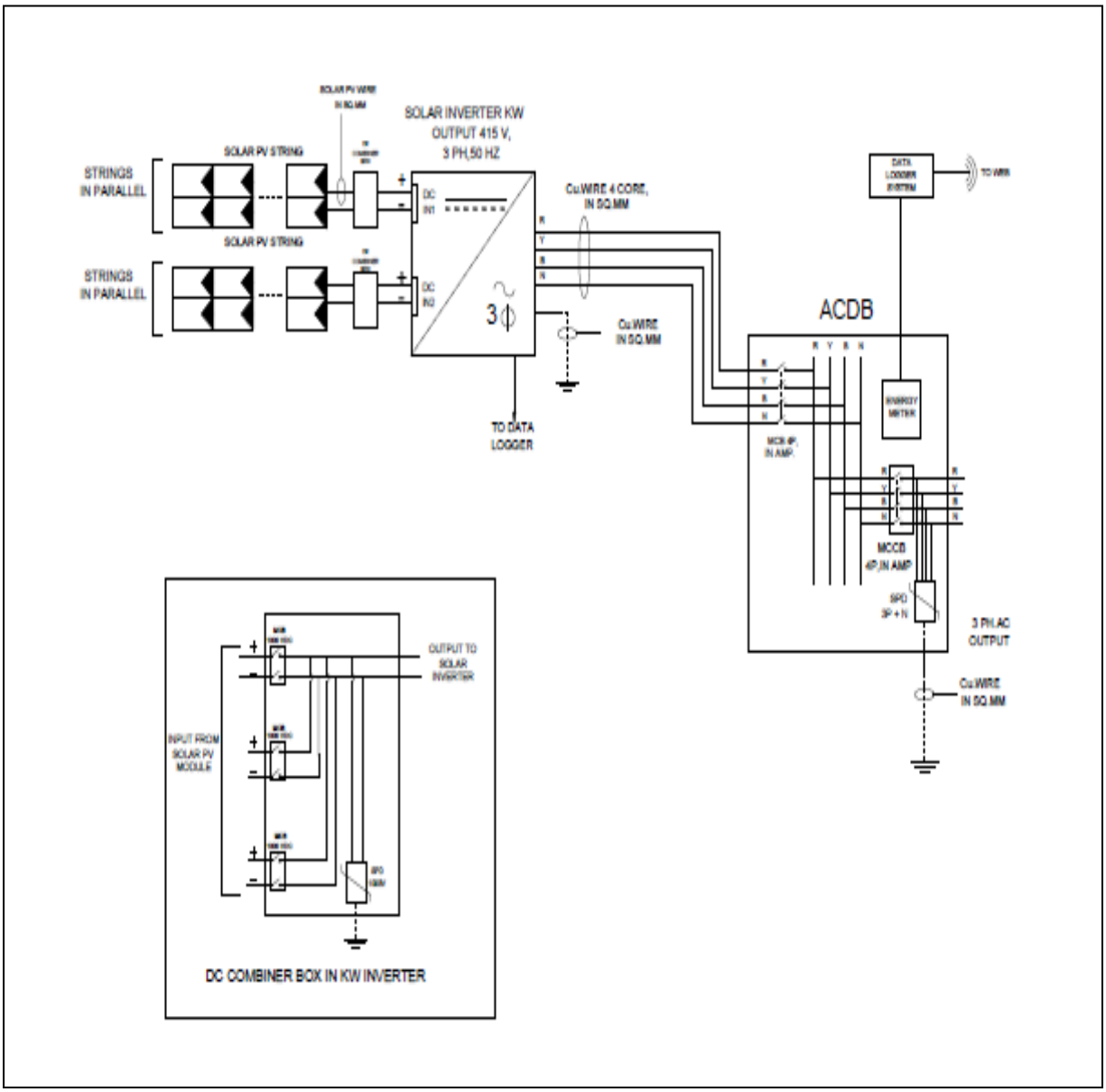
6. If we are not found eligible for registration as System Integrators CREDA may forfeit our EMD.

Seal and Signature of Authorized Signatory.

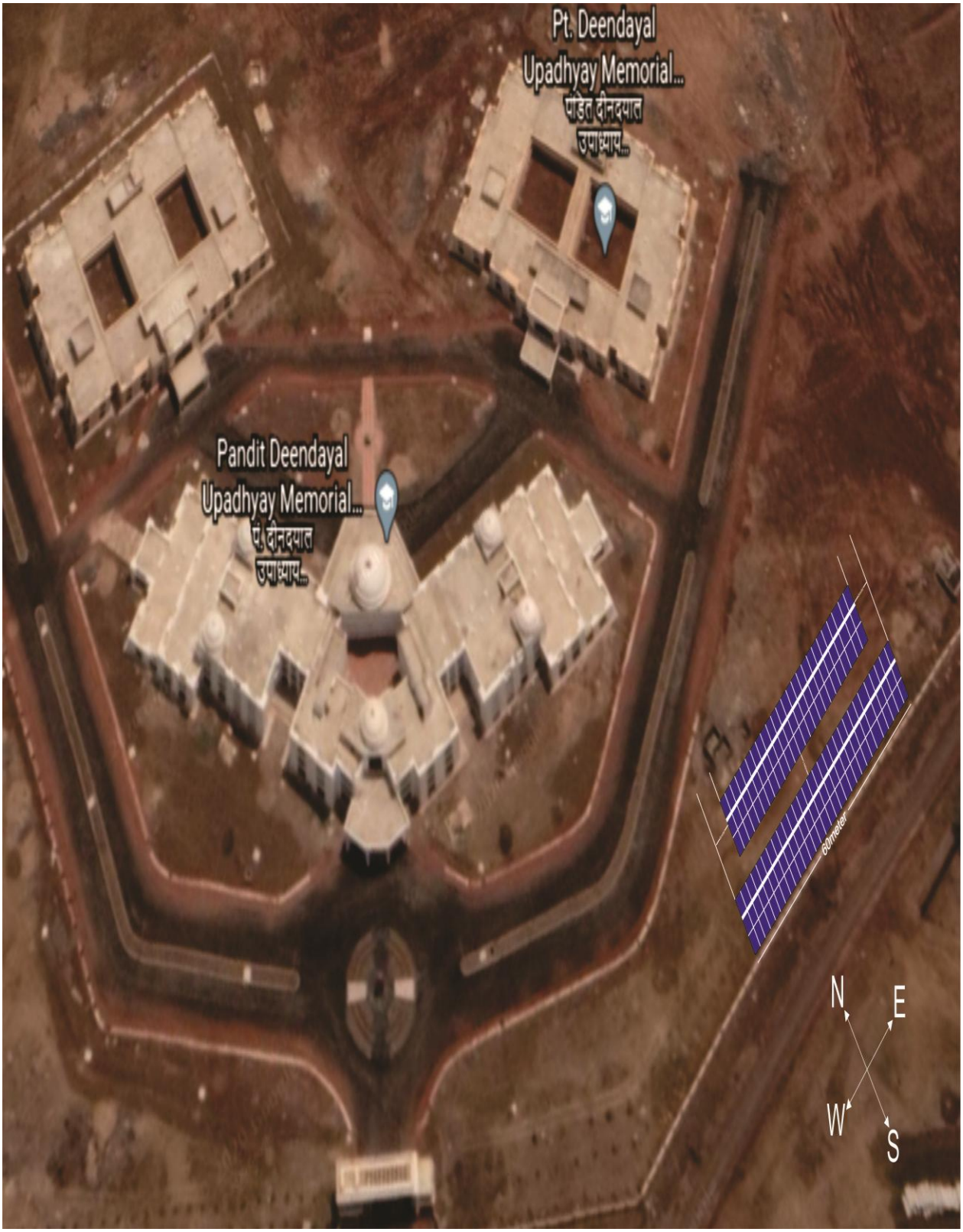
Name of the Firm

Date:-

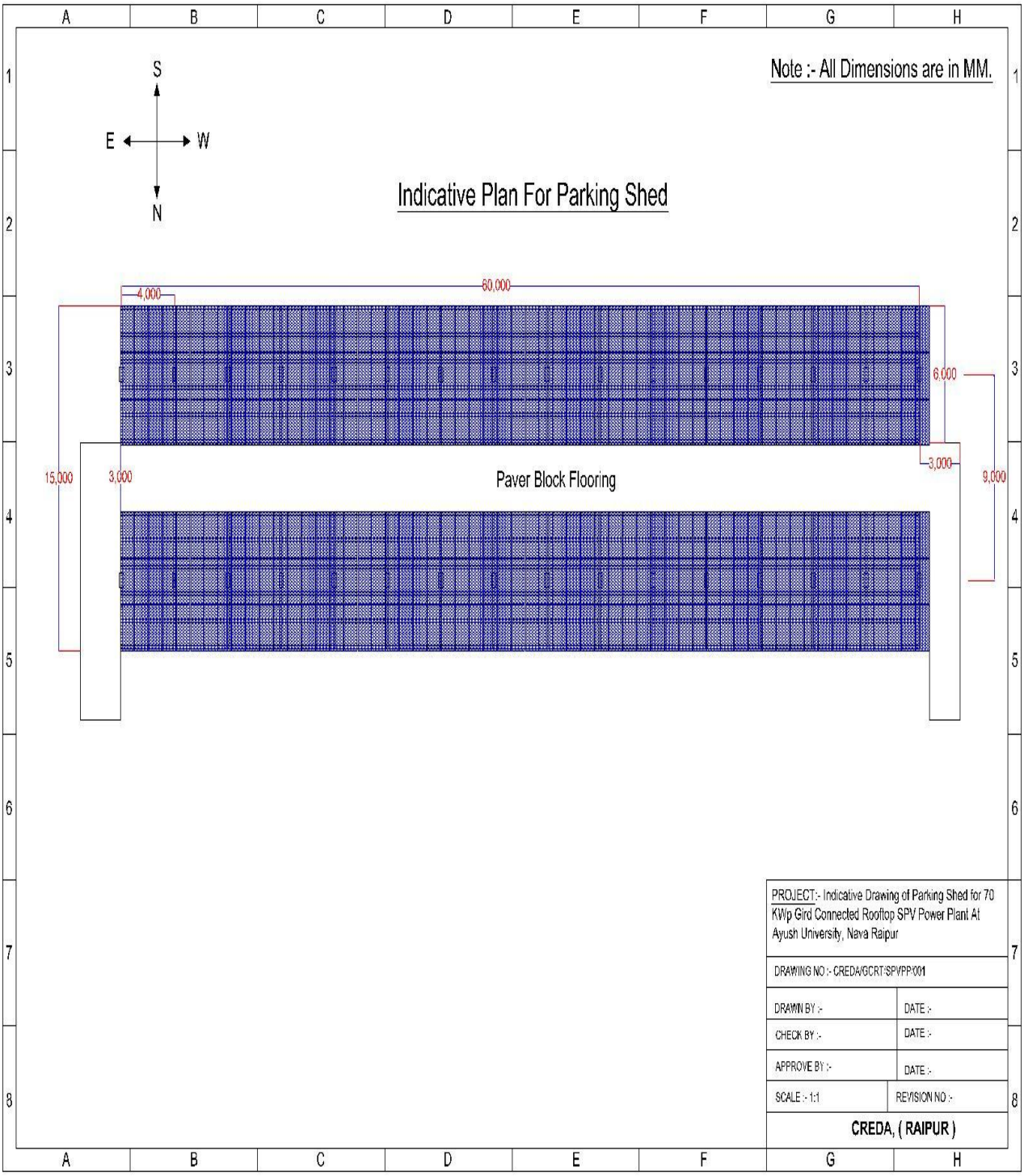
Typical Single Line Diagram



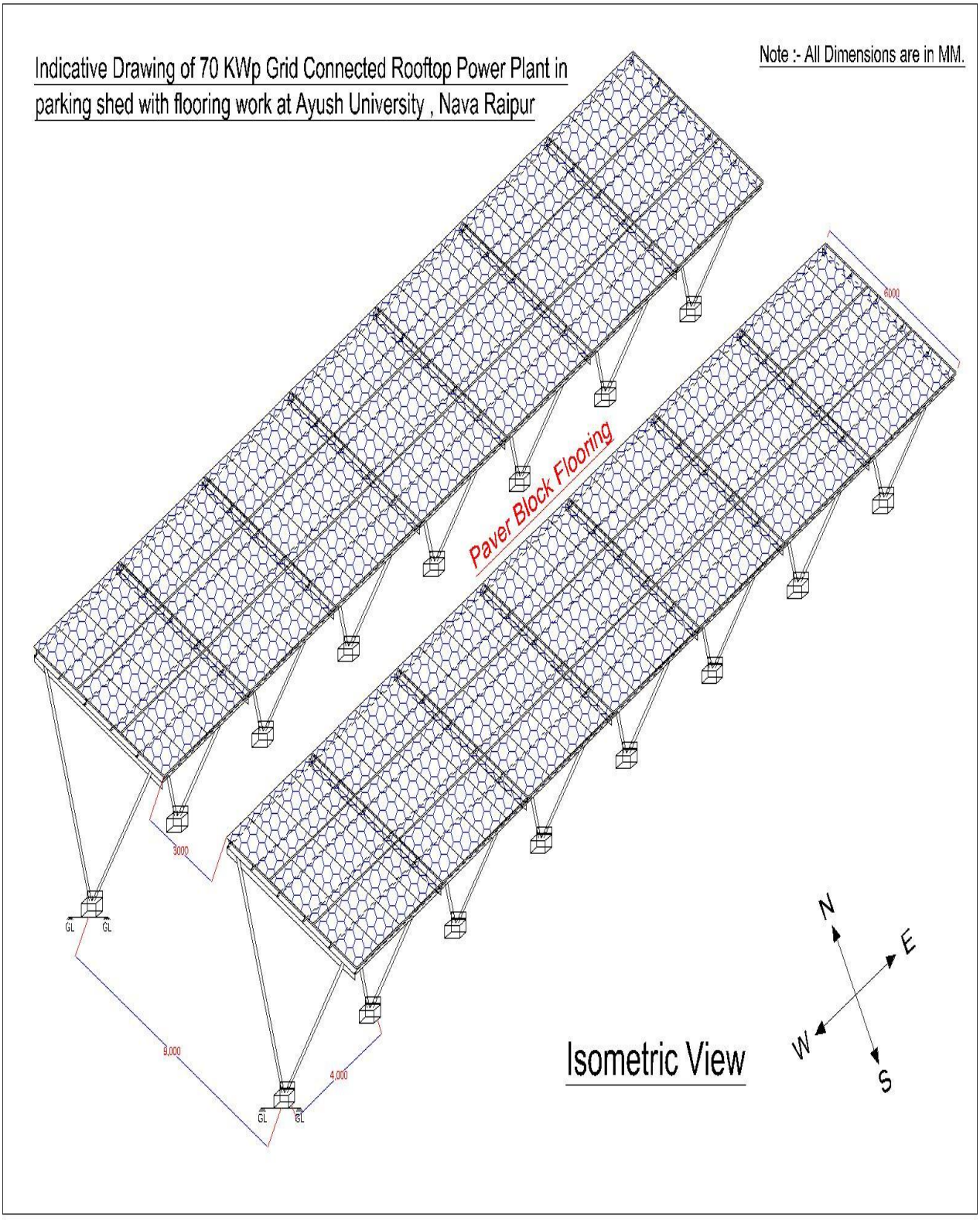
Indicative Drawing of Parking Shed for Pt. Deendayal Upadhaya Memorial Health Science & Ayush University, Uparwara, Nava Raipur, Chhattisgarh.



Indicative Drawing of Parking Shed for Pt. Deendayal Upadhaya Memorial Health Science & Ayush University, Uparwara, Nava Raipur, Chhattisgarh.



Indicative Drawing of Parking Shed for Pt. Deendayal Upadhaya Memorial Health Science & Ayush University, Uparwara, Nava Raipur, Chhattisgarh.



Indicative Drawing of Parking Shed for Pt. Deendayal Upadhaya Memorial Health Science & Ayush University, Uparwara, Nava Raipur, Chhattisgarh.