

Ref No: 1617/YPS

Dated: 25 Aug 2023

**TENDER DOCUMENT  
FOR  
EXECUTION OF  
90 KWp GRID CONNECTED ROOFTOP  
SOLAR PV POWER PLANT  
AT  
YPS PATIALA**

JUNIOR SCHOOL - 50 KWp

SQUASH COURT - 40 KWp

**Owner**

**Address:** Yadavindra Public School  
Stadium Road  
Patiala – 147001 (Punjab)

**Phone:** 0175 221 7631

**Mob** : 9417017632

**TENDER DOCUMENT FOR EXECUTION OF 90kwp GRID CONNECTED ROOF TOP SOLAR PV POWER PLANT INCLUDING DESIGN, SUPPLY, ERECTION, COMMISSIONING, PERFORMANCE GUARANTEE AND HANDING OVER**

**Name of Works** : Execution of 90 KWp Grid connected roof top solar PV Power Plant including design, supply, erection, commissioning, Performance Guarantee, handing over at YPS Patiala.

**Estimated Cost** : ₹ 45 Lakhs

**EMD** : ₹1 lakh by Demand Draft.

**Eligibility** : The eligible companies conforming to eligibility criteria laid down in the tender document may submit the same in sealed envelope to the Director, YPS Patiala latest by **15 Sep 23 up to 1300Hrs** super scribing the envelope, enclosing all requisite documents, with name of work and drop the envelope in the tender box kept at Admin Office. YPS Patiala reserves the right to reject any or all tenders and to call off the process of finalizing of contractors, at any stage without assigning any reasons.

## TENDER NOTICE

**Ref No: 1617/YPS**

**Date: 25/08/2023**

Director, YPS PATIALA invites sealed tenders in two bid system (Technical and Price Bid) for grid connected rooftop solar power plants program, for execution of the following works.

Name of work	Execution of 90 KWp grid connected rooftop solar PV power plant at YPS Patiala at two different sites as below:
Location	Junior School - 50 KWp Squash Court - 40 KWp
Estimated cost	45 Lakh
Period of completion	6 Months
Eligibility	For details please see the tender document
Cost of tender document	Rs. 5000/-
Last date and time of receipt of tender	<b>15 Sep 2023, 1300 Hrs</b>
Date and Time for Opening of Tender	<b>15 Sep 2023, 1500 Hrs</b>

Tender document should be downloaded from YPS PATIALA website: [www.ypspatiala.in](http://www.ypspatiala.in) Tenderer should enclose DD for Rs.5000/- towards the cost of tender document along with the technical bid. Tenders not accompanied by the tender document fee will be rejected.

Director, YPS PATIALA

## TABLE OF CONTENTS

<b>SECTION</b>	<b>SUBJECT</b>	<b>PAGE NO</b>
VOL - I	General Instructions to Tenderer along with Eligibility Criteria	5-24
VOL – II	General Conditions of Contract	25-39
VOL – III	Special Conditions of Contract	40-52
VOL –IV	Scope of work	53-55
VOL – V	Technical Specifications	56-75
VOL – VI	Technical Description Bill of Quantities / Items (Annexure – I – Technical), Approved make standards	76-82
VOL - VII	HT Electricity bill of YPS PATIALA	83

# **VOL-I**

## **Eligibility Criteria**

## **I. NOTICE FOR INVITATION OF TENDERS**

Sealed Tenders on Item Rate basis are invited by Yadavindra Public School, Stadium Road, Patiala for Execution of 90 KWp grid connected rooftop solar PV power plant at YPS Patiala

\*Tender to be addressed & Deposited at : Director  
Yadavindra Public School  
Patiala

&

Tenders are to be deposited in a sealed envelope at security gate marked as **TENDER FOR EXECUTION OF 90 KWP (50 KWp + 40 KWp) GRID CONNECTED ROOFTOP SOLAR PV POWER PLANT AT YPS PATIALA.**

- \* Earnest Money Deposit (EMD): an amount of Rs.1 lakhs in the form of a bankers cheque or demand draft in favour of Director, YPS PATIALA payable at Patiala from any nationalized bank.
- Time of Completion of work -Time of completion from the date of PO :- 6 months
- \* Last Date and Time for Receipt of Tenders : **15 Sep 2023 Up to 1300 hrs.**

Director, YPS PATIALA is not bound to accept the lowest tender and reserves the right to acceptor reject any or all Tenders without assigning any reason whatsoever.

The blank tender documents with eligibility criteria terms and conditions are to be downloaded from YPS PATIALA website: [www.ypspatiala.in](http://www.ypspatiala.in). Contractor who downloaded the tender document are required to submit a DD of Rs.5000/- drawn in favour of Director YPS PATIALA along with the technical bid, towards tender document cost. Tender without DD of Rs.5000/- will be out rightly rejected.

## GENERAL INSTRUCTIONS TO TENDERERS

### **1.0 Scope of Tender:**

(YPS PATIALA) referred to as Owner in these documents) invites tenders for Execution of 90 KWp grid connected rooftop solar PV power plant at YPS Patiala detailed in the Notice Inviting Tenders (NIT) The successful tenderer shall complete the works within the completion date specified in the Notice Inviting Tenders (NIT).

### **2.0 Non Association / Relation:**

Should a contractor or a tenderer have a relative, employed in YPS PATIALA or in case of partnership firm or company incorporated under the Indian company act, should a partner or relative of the partner or a share holder be employed in a responsible capacity in YPS PATIALA, the authority inviting the tender should be informed of the fact at the time of submission of tender, failing which the tender may be rejected. If such fact is suppressed at the time of tendering and comes to light at any time after acceptance of tender, the contract may be rescinded.

### **3.0 Eligibility Criteria:**

Tenderers must have executed similar nature of works during the last three financial years ending with March 2023 as mentioned below.

- One similar nature of work not less than 80 KWp  
or
- Two similar nature of work not less than 60 KWp  
or
- Three similar nature of work not less than 50 KWp

Note : Similar nature of work means experience in designing roof top solar power plant, manufacturing / sourcing of related equipment, erection, installation, testing, and evaluation including civil / structural construction, post commissioning service and maintenance etc all on turnkey basis.

2. The tenderer shall furnish a copy of valid GST registration of commercial tax department.
3. The tenderer should furnish copy of permanent account number (PAN) and copy of latest income tax returns submitting along the proof of receipt.

### **4.0 Qualification of the Tenderer**

**4.1** All Tenderers shall provide Eligibility Criteria information as per proforma enclosed.

**4.2** All Tenderers shall include the following information by producing relevant documents and certificate with their Tender.

- a) Conditions of the contract enclosed each page duly signed by the tenderer as token of acceptance. If any deviation is proposed by the tenderer the same must be clearly indicated and enclosed as deviation list but tenders with significant deviations list and merely enclosing tenderer's printed conditions or their own terms and conditions will make the tender liable for rejection.
- b) Earnest money deposit as laid down in these instructions to tenderers.
- c) Tender document cost.

**5.0 Cost of Tendering & inspection of site**

**5.1** The Tenderer shall bear all costs associated with the preparation and submission of his Tender, tenderer shall not be entitled to any cost, expenses or other claims whether or not the tender is accepted, rejected or invitation to Tender withdrawn or cancelled and the Owner will in no case/way be responsible and liable for those costs.

**5.2** The Tenderer, at the Tenderer's own responsibility shall visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Tender and entering into a contract for Execution of 90 KWp grid connected rooftop solar PV power plant at YPS Patiala. The costs of visiting the site shall be at the Tenderer's own expense.

**ELIGIBILITY CRITERIA INFORMATION**

**CHECKLIST TO ACOMPANY THE TENDER**

<b>Sl. No.</b>	<b>Document to be Submitted</b>	<b>Description to be given</b>	<b>Scanned documents/ Photocopy to be attached</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
1.a)	PV cell manufacturers & PV module manufacturers company experience with BIS/IEC certificate	BIS/IEC Certificate	Yes / No
b)	Partnership deed in case of firms & Article of Association in case of companies		
2.	Copy of Permanent Account Number (PAN) card and copy of latest Income Tax returns submitted along with proof of receipt.	PAN & IT Returns	Yes / No

<b>Sl. No.</b>	<b>Document to be Submitted</b>	<b>Description to be given</b>	<b>Scanned documents/ photocopy to be attached</b>
3	E.M.D	EMD	Yes / No
4	GST Registration number	GST Registration	Yes / No
5	Cost of Tender document ₹5000/-.	Yes / No	Yes / No

All experience certificates including those in support of existing commitments issued by a competent authority.

## STATEMENT – I

Details of similar grid connected roof top solar PV power plants works completed in the name of the Tenderer during the last three financial years.

Sl. No	Name of the work	Address of Agreement. Concluding Authority	Agreement No. & dated. With telephone number	Value of Contract In Lakhs	Stipulated period of completion	Actual date of completion
1	2	3	4	5	6	7

Value of work had done year wise during the last 'three' years.			Total value of work done.
1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	
8	9	10	11

Attach certificates issued by the Executive Engineer or concerned head of the department showing work wise / year wise value of work done and date of completion.

**Signature of the Contractor**

### 6.0 Contents of documents

- Contract documents consists of
- Notice for invitation of Tenders
- Instructions to Tenderers
- Articles of Agreement
- General conditions of contract (GCC)
- Special conditions of contract (SCC)
- Schedule of Fiscal Aspects
- General Technical Specifications
- Approved Makes
- Bill of Quantities
- Detailed technical description of Bill of Quantities
- Scope of work

The Tenderer shall be deemed to have examined all instructions, forms, terms, and specifications in the Documents. Failure to furnish the information required by the Tender Document or submission of a Tender not substantially responsive to the Tender Documents in every respect will be at the Tenderer's risk and may result in the rejection of the Tender. In case of any discrepancy between the Schedule of Quantities, the specifications and/ or the drawings, given in the tender document the following order of preference shall be observed:

Description of Schedule of Quantities.  
Particular Specification and Special condition, if any.  
Specifications.  
Latest edition Indian Standard Specifications of B. I. S.  
Drawings.

### **7.0 Amendment of Tendering Documents**

**7.1** Before the deadline for submission of Tenders, the Owner may modify the Tender documents by issuing addenda.

**7.2** Owner shall have the right to amend/delete/add to the various provisions in the tender documents or withdraw/cancel the invitation to tender without assigning any reasons whatsoever. The amendments/errata if issued by the owner shall be read carefully in conjunction with tender documents. The quoted price/rate/amount shall be deemed to be worked out taking into account amendments / errata also.

**7.3** Any addendum thus issued shall be part of the Tender documents and shall be communicated in writing by email to all the eligible contractors. The eligible contractors shall acknowledge receipt of each addendum by email to the Owner.

**7.4** To give prospective Tenderers reasonable time in which to take an addendum into account in preparing their Tenders, the Owner may extend if necessary the deadline for submission of Tenders.

### **8.0 Earnest Money Deposit (EMD)**

Tender EMD amount of **Rs.1,00,000/-** in the form of a banker's cheque or demand draft in favour of Director, YPS PATIALA, payable at Patiala must accompany each Tender. **Tenders not accompanied by EMD and unconditional acceptance letter will be summarily rejected.**

**8.1** The EMD of the unsuccessful Tenderers will be discharged / returned within 8 weeks from the last date of tender submission.

**8.2** The EMD of successful tenderer shall be adjusted against security deposit.

**8.3** The EMD may be forfeited: if the Tenderer withdraws his Tender during the validity period of the Tender; or in case of a successful Tenderer fails to furnish performance guarantee.

**9.0 Period of validity of Tender**

The Tender shall remain valid for a period of 90 days after the last date of the submission of tender. A Tender valid for a shorter period, may be rejected by the owner.

**10.0 Language of Tender**

**10.1** The document shall be written in English language. The total amount should be written in the same language.

**10.2** Tender including tender drawings, if any, and other information shall be prepared and submitted in English language only.

**11.0 Document comprising the Tender**

**11.1** No page of this Tender document shall be removed and the set must be submitted as it is. Each page of the Tender document form is to be signed by the Contractor and must bear the Seal of the Company/Firm.

**11.2** The Tender submitted by the Tenderer shall comprise of the following:

**11.2.1. Technical bid** in a separate sealed cover comprising of.

- a) Eligibility Criteria Information
- b) Instructions to tenderers
- c) Conditions of the contract enclosed, each page duly signed by the tenderer as token of acceptance. If any deviation is proposed by the tenderer the same must be clearly indicated and enclosed as deviation list but tenders with significant deviations list and merely enclosing tenderer's printed conditions or their own terms and conditions will make the tender liable for rejection.
- d) Specifications & drawings
- e) Earnest money deposit as laid in these instructions to tenderers.
- f) Statement of list of deviations if any from tender conditions.
- g) Tender cost of ₹5000/- in the form of D.D. in favour of Director, YPS PATIALA.

11.2.2. **Price Bid** in a separate sealed cover comprising

a) Price Schedule with prices (Both in words and in figures) strictly in accordance with the price schedule format of the tender document. Departure from the price schedule format may render the tender liable for rejection

11.2.3. These two Sealed covers are to be placed in a single envelop. The envelop duly sealed & super-scribed with the name of work should be addressed to The Director, YPS PATIALA, on or before the scheduled date and time. **I.e. 15 Sep 2023 up to 1300Hrs.**

## **12.0 Tender Prices**

12.1 The contract shall be for the whole works as described in tender document based on the priced Schedule of Quantities submitted by the Tenderer.

12.2 The tender submitted on behalf of a Firm/Company, shall be signed by a person who has the proper legal authority on behalf of the Company to enter into the contract; otherwise, the tender is liable to be rejected. Each page of the tender document and each drawing accompanying is required to be signed by the authorized person submitting the tender, affixing the Firm/company seal in token of their having examined and acquainted themselves with the contents of each page. The forms of tender are to be filled in completely. Any tender with any of the documents not duly signed is liable to be rejected.

- 12.3** The Tenderer shall fill in the rates for all items of the Works described in the Schedule of quantities along with total tender price. **In case the rates are not filled for any of the Items of Schedule of Quantities, in such cases the rate will be considered as zero and the contractor has to accept for the amount arrived based on zero rate for non quoted items.** Failure to comply with either of these conditions will make the tender liable for rejection and forfeiture of Earnest money.
- 12.4** All duties, taxes, and other levies payable by the Contractor under the contract, or for any other cause, shall be included in the rates, prices and total tender price submitted by the tenderer. Tenderers must include in their rates, the cost of transportation of materials to site, sales tax, Income tax, Value added tax (VAT), Cess as per Building & Other Construction Workers Cess Act, excise duty, octroi, and any other tax and duty levied by the Central / State Government. None of the above taxes & levies will be entertained separately by the Owner and no tax exemption forms will be issued by the Owner. VAT on works contract will not be reimbursed to the Contractor. All the taxes levied other than IT should be paid either directly by the contractor to the statutory authorities and challans / proof of payment with acknowledgement shall be provided by the contractor before release of the payment of next bill or shall be deducted at source. Contractor should also take a Group Insurance Policy for his Workmen, Supervisors and Engineers working on site for an adequate insurance cover. YPS PATIALA shall not be responsible for any accident or any untoward/unforeseen event involving workmen, labour, supervisor or engineer or any person directly or indirectly associated with the execution of work. The insurance policy to be obtained by the successful Tenderer must be comprehensive and shall cover all associated risks (known and unknown) from any Government Insurance Company.
- 12.5** The rates quoted in the tender shall include cost of telephone rent and call charges, for execution of work at site, hire for any tools and tackles, shed for materials, marking out and transportation complete, cleaning the buildings and surroundings after execution of the total works and dumping the waste at designated place as directed by the Owner in all respects. The rates quoted in the tender shall be treated as rates for finally completing the item of work.
- 12.6** The quantities furnished in the schedule of quantities are only probable quantities and are liable to alterations, by omission, deductions or additions to any extent at the discretion of Owner. Payments will be regulated on the actual quantities of work done at accepted rates. Any item of work may be omitted from the schedule of quantities and may be awarded to another agency at any time / stage of the work for which no compensation will be paid by the Owner i.e. for non-operated BOQ items and short closed BOQ items.
- 12.7** The rates and prices quoted by the Tenderer shall be fixed for the duration of the contract and shall not be subject to escalation or adjustment on any account even if the work is delayed due to unavoidable circumstances beyond the control of owner/consultant.

- 12.8** The calculations made by the tenderer should be based upon quantities of the items of work which are furnished in the Schedule of Quantities, but it must be clearly understood that the contract is not a lump sum contract. The Owners do not in any way assure, represent or guarantee that the said probable quantities are correct or that the work would correspond thereto. The items of work irrespective of the quantities which may vary shall be carried out at the same accepted tender rates and no escalation in the rates will be entertained whatsoever. Any item of work may be omitted from the schedule of quantities and may be awarded to another agency at any time / stage of the work.
- 12.9** The tenderers must obtain for themselves on their own responsibility and their own expenses all the information which may be necessary, including risks, contingencies and other circumstances to enable them in making a proper tender and for entering into a contract, and must examine the drawings, specifications and conditions and inspect the site of the work, nature of the work, availability of power, water, shelter for workmen and all the matters pertaining thereto before submitting the tender.

### **13.0 Format and signing of Tender document**

- 13.1** The tenderer shall seal the bid in an envelope, duly marked as **TENDER FOR EXECUTION OF 90 KWp (50 KWp+40 KWp) GRID CONNECTED ROOF TOP SOLAR PV POWER PLANT AT YPS PATIALA,**
- 13.2** Which shall include Tender form duly signed by the tenderer on their letter head along with documents mentioned under clause 11.2 and priced BOQ document in single envelope. Please refer "Clause No. 11.2 of preparation of tender documents comprising tenders in Instructions to Tenderers".
- 13.3** The Tender shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Tenderer. All pages of the Tender where entries or amendments have been made shall be initialed by the person or person signing the Tender.
- 13.4** The Tender shall contain no alterations or additions, except those to comply with instructions issued by the Owner, or as necessary to correct errors made by the Tenderer, in which case such corrections shall be initialed by the person or persons signing the Tender. **ANY CONDITIONAL TENDER WILL BE SUMMARILY REJECTED.**

### **14.0 Sealing and marking and submission of Tenders**

The Tenderers are requested to quote their offers in two separate sealed envelopes:

- 1<sup>st</sup> Envelope (Technical Bid):** Comprising of Earnest Money Deposit as per clause No. 8 of Instructions to Tenderers. Etc., with all tender documents (Volumes I,II, III, IV, V, VI, VIII & IX) duly sealed and signed
- 2<sup>nd</sup> Envelope (Price bid)** :Priced BOQ document (Volume – VII) duly signed and sealed. Please refer “Clause No. 11.2.2 of Preparation of tender documents in Instructions to Tenderers”.

**These two envelopes are to be placed in a single envelope and shall be duly sealed indicating the name of work i.e. TENDER DOCUMENT FOR EXECUTION OF 90 KWp (50 KWp + 40 KWp) GRID CONNECTED ROOF TOP SOLAR PV POWER PLANT AT YPS PATIALA, . and deposited in the tender box kept at the YPS PATIALA ADMIN OFFICE on or before due date and time of submission of tender.**

In addition to the identification required in Clause 11.2.3 the inner envelopes shall indicate the name and address of the Tenderer to enable for the Tender to be returned unopened in case it is declared late, pursuant to Clause 15.0

- 14.1** If the outer envelope is not sealed and marked as above, the Owner will assume no responsibility for the misplacement or premature opening of the Tender.

#### **15.0 Last date for submission of Tenders**

- 15.1** Any Tender received by the Owner after the date and time of submission of Tenders i.e. up to **1300 Hrs On 15 Sep 2023** will be rejected and returned unopened to the Tenderer.

#### **16.0 Clarification of Tenders**

- 16.1** To assist in the examination, evaluation, and comparison of Tenders, the Owner may, at his discretion, ask any Tenderer for clarification of his Tender, including breakdowns of unit rates. The request for clarification and the response shall be in writing by email, but no change in the price or substance of the Tender shall be sought, offered, or permitted.

#### **17.0 Examination of Tenders and Determination of Responsiveness**

- 17.1** Prior to the detailed evaluation of Tenders, the Owner will determine whether each Tender (a) meets the eligibility criteria defined in clause 3.0; (b) has been properly signed and meets the requirements as in clause 3.2; (c) is accompanied by the required securities and; (d) is substantially responsive to the requirements of the Tendering documents.
- 17.2** A substantially responsive Tender is one which confirms to all the terms, conditions, and specifications of the Tendering documents, without material

deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works (b) which limits in any substantial way, the Owner rights or the Tenderers' obligations under the contract; or (c) whose rectification would affect unfairly the competitive position of other Tenderers presenting substantially responsive Tenders.

**17.3** If a Tender is not substantially responsive, it will be rejected by the Owner, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

**19.0 Evaluation and Comparison of Tenders**

**20.0** The price bid of unqualified contractors contained in envelope (Price Bid) and EMD contained in envelope (Technical Bid) will be returned to them without opening the envelope (Price Bid) seal.

**21.0 The Owner reserves the right to accept or reject any variation, deviation, or alternative offer and other factors which are in excess of the requirement of the Tendering.**

**22.0 Award criteria**

**22.1** The acceptance of Tender will rest with the Owner, which does not bind itself to accept the lowest tender and reserves to itself the authority to reject completely / partially, any or all of the Tender/s received without the assignment of a reason.

**22.2** The owner reserves to itself the right of accepting the whole or any part of the Tender and the Tenderer shall be bound to perform the same at the rate quoted.

**22.3** The Owner reserves to itself the right of omission of any item of work from the awarded tender at any time / stage during the execution of work and award the same to another agency / contractor.

**23.0 Notification of award**

**23.1** The successful Tenderer will be issued a Letter of Intent (LOI) / Purchase Order (PO) / Work order and the date of commencement of work will be as mentioned in the LOI or PO or WO.

**25.0 Security Deposit (SD)**

**25.1** Security@ 5% will be retained from the running bills and the final bill of the contractor. The earnest money shall be converted into security deposit, so that total security deposit including the earnest money shall amount to 5% of the work done, which will be returned 2.5% after 6 months of actual completion of work. Remaining half will be released after successful completion of the defect liability period. The contractor is eligible for refund of full security deposit if the defects in workmanship and quality of

work are attended by the contractor. Failing which the cost of rectification of defects shall be recovered from security deposit. The contractor shall obtain no defects certificate from concerned YPS PATIALA staff before claiming the refund.

**26.0 Signing of contract form**

**26.1** On the acceptance of LOI / PO / WO and Performance Guarantee of the successful Tenderer, the Owner will send the Tenderer the contract form provided in the Tender document duly signed and sent along with the Tender incorporating all agreements between the parties.

**27.0 During Execution**

**27.1** The Contractor shall carry out all the works strictly in accordance with the drawing, details and instructions of the Consultants/Owner. If in the opinion of the Owner / Consultants, changes have to be made in the design, and they desire the contractor to carry out the same, the Contractor shall be bound to comply. The Consultants/Owner decisions in such cases shall be final.

**27.2** The Contractor is bound to carry out any items of work necessary for the completion of the job even though such items are not included in the schedule of quantities and rates. Schedule of instructions in respect of such additional items and their quantities will be issued in writing by the Consultants with the prior consent from the Owner. Rates for such items of work will be recommended by the Consultants/Owner for approval by the Owner on the basis of Analysis of Rates which will be derived from **actual prevailing market rates of similar item along with 10% as contractor's profit & overhead**. The rates approved by the Owner in such cases will be final.

27.2 The Consultants/ Owner may at any time / stage of execution demand for the Analysis of Rates for any item / items of work which in their opinion is are abnormally high / low rates or required for the Analysis of Rates of other tender / extra item / items. The Contractor is bound to present the same and if the Contractor is unable to present a justified Analysis of Rates for any item / items, the rate / rates for such item may be adjusted accordingly and the decision of the Owner in such cases shall be final.

27.3 The Contractor shall get the quality of work done inspected for material and workmanship at different stages of execution as per instructions given by the Consultants/ Owner or their representative time to time. Any item of work done which is found not conforming to the Contract shall be rejected by the Consultants/Owner. The decision of the Consultants/ Owner in such cases shall be final.

27.4 The Consultants/ Owner may instruct at any stage of execution for testing of any material taken at random. In case material is found to be of sub-standard quality, the same shall be rejected by the Consultants/Owner. The decision of the Consultants/ Owner in such cases shall be final.

27.5 The Contractor shall not be entitled to any compensation suffered by him on account of delays in commencing or executing the work whatever the cause of delay may be, including delays arising out of modifications to the work entrusted to him or in any subcontracts connected therewith or delays in awarding contracts for other trades of the project or in commencement or completion of such other works or in procuring Government controlled or other building materials for any other reasons whatsoever. The Owner shall not be liable for any sum besides the tender amount, subject to such variations as are provided for here in and as instructed by Consultants/ Owner. However, necessary time extension will be given if the delays are not attributed to the Contractor.

ARTICLES OF AGREEMENT

Made at .....this.....day  
of.....2023...Between.....  
..... (Hereinafter referred to as the Owner which expression shall include its heirs, Executors, Administrators & Assignees) of the one part and  
.....  
..... (Hereinafter referred to as the Contractor which expression shall include his heirs, Executors, Administrators & Assignees) of the other part

WHEREAS the Owner is desirous of carrying out EXECUTION OF 90 KWp (50 KWp + 40 KWp) GRID CONNECTED ROOF TOP SOLAR PV POWER PLANT AT YPS PATIALA, and the priced Schedule of quantities have been signed by or on behalf of the parties hereto and WHEREAS the Contractor has agreed to execute upto and subject to the conditions set forth herein (hereinafter referred to as "the work shown upon the said Drawings" and described in "the said Specifications & scope of work" and the said "Priced Schedule of Quantities at the respective Rates mentioned in the Priced Schedule/ Purchase Order of Quantities attached.

And WHEREAS the Contractor has agreed to submit the performance guarantee to YPS PATIALA for Rs. .... (Rupees.....  
.....Only)

by him as performance guarantee for the due fulfillment of the contract to the satisfaction of the owner (YPS PATIALA)

**NOW IT IS HEREBY AGREED AS FOLLOWS:**

- (1) In consideration of the payments to be made to the Contractor as hereinafter provided he shall upon and subject to the conditions of contract execute and complete the works shown upon the said drawings and such further detailed drawings as may be furnished to him by the said Consultants/Owner and described in the Specifications & scope of work and the said Priced Schedule of Quantities.
- (2) The Owner shall pay the Contractor such sums as shall become due and payable hereunder at the times and in the manner specified in the said conditions.
- (3) The tender drawings, agreement, documents, scope of work and terms and conditions of NIT above mentioned shall form the basis of this Contract and the decision of the owner for the time being as mentioned in the Conditions of the Contract in reference to all matters of dispute as to the material, workmanship or account and as to the intended interpretation of the clauses of this agreement or any other document attached hereto shall be final and binding on both parties.

- (4) The Owner reserves the right of altering the drawing and nature of work and of adding to or omitting any items of work and of having portions of the same carried out departmentally or otherwise and such alterations or variations shall be carried out without prejudice of this contract.
- (5) The said Contract comprises the work above mentioned and all subsidiary works connected there to within the same site as may be ordered to be done from time to time by the said Owner or the other Owner for the time being even though such works may not be shown on the drawings or described in the said specifications or the Priced Schedule of Quantities.
- (6) Time shall be considered as essence of the agreement and the contractor hereby agrees to commence to work as soon as his tender is accepted by YPS PATIALA by issuing LOI / WO / PO and the site is handed over to him as provided in the said conditions and agrees to complete the work within the period 6 months from the date of such handing over the site.
- (7) The said conditions shall be read and construed to be forming part of this agreement and the Parties hereto will respectively abide by and submit themselves to the conditions and stipulations and perform the agreement on their parts respectively in such conditions contained.
- (8) All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen in Patiala and only the courts in Patiala alone shall have jurisdiction to determine the same.
- (9) The arbitrator for fulfilling the duties set forth in the arbitration clauses as defined with tender conditions of contract.
- (10) Arbitration: The C o n t r a c t s h a l l b e g o v e r n e d b y , and construed in accordance with the laws of India. Any dispute which cannot be amicably settled by the parties may be submitted, by the owners, to the Director, YPS Mohali, the Arbitrator. The dispute will be settled following the provisions of Arbitration and Conciliation Act, 1996. Both Parties agree that the results and awards of any such arbitration shall be binding on both Parties. Venue of Arbitration shall be Patiala.

(11) The several parts of this contract have been read to us and fully understood by us.

As witness our hands this.....day of  
.....2023.....

.....  
Signed by the said Owner

.....  
in the presence of

.....  
Signed by the said Contractor

.....  
In the presence of

-23-  
FORM OF TENDER

(To be submitted by the Tenderer in letter head).

From :

To,  
Director  
**YPS PATIALA**  
Stadium Road, Patiala, Punjab 147001

Dear Sir,

- 1.0 Having examined the Tender documents consisting of the Tender notice, General Instructions to Tenderers, General Conditions of Contract, Special Conditions of Contract, specifications, plans, Drawings, scope of work Time Schedules, Form of Contract , form of tender, form of schedule Rates, Bill of Material etc., and having understood the provisions of the said tender documents and also having thoroughly studied the requirements of YPS PATIALA, related to the work tendered for in connection with the Execution of 90 kwp (50 KWp + 40 KWp) grid connected roof top solar PV power plant at YPS Patiala, and having conducted a thorough study of the job site involved, the site conditions, power, water, material and equipment availability, the transport and communication facility and the availability and suitability of borrow areas etc., we hereby submit our tender offer for the performance of proposed work in accordance with the terms and conditions and within the time mentioned in the tender documents at the rates included within the tender documents and based on application of the rates tendered in the accompanying schedule of rates to the relative quantities indicated in the form of schedule rates forming part of the tender documents.
- 2.0 If the work or any part thereof is awarded to me/us, I/we undertake to perform the work in accordance with the contract documents as defined in the form of contract forming part of the tender documents and accept the terms and conditions of contract as laid down therein and undertake that on receipt of acceptance of tender and on confirmation. I/We will deposit such sums as may be necessary under the terms of contract and abide by the terms of the tender. I/We will also sign the necessary contract and other documents to commence the work and execute the work as per the terms and conditions contained in the tender documents failing which YPS PATIALA shall be at liberty, without further reference to me/us and without prejudice to any of its rights to terminate the contract and or to forfeit the earnest money deposit and take further course of action.
- 3.0 I/We further undertake to keep our tender offer open for a period of not less than 90 days from the due date of submission of the tenders as specified in the General Instructions to tenderer forming part of the tender documents. `

4.0 I/We hereby undertake that the statements made herein/information above are true in all respects and that in the event of any such statement or information being found to be incorrect in particular, the same may be construed to be a misrepresentation entitling YPS PATIALA to avoid any resultant contract and take further action as may be justified. I/We confirm having deposited EMD of Rs.1 Lakhs in the form of DD no:                      dt                      Bank:

Yours faithfully,

Signature of the tenderer

Name and designation of the  
Authorized person signing the Tender  
on behalf of the Tenderer.

Name:

Designation.

Address.

Witness :

**VOL – II**

**GENERAL CONDITIONS  
OF  
CONTRACT (GCC)**

## **GENERAL CONDITIONS OF CONTRACT (GCC)**

### **A: GENERAL**

#### **1.0 Definitions**

**1.1** In this contract, the following terms shall be interpreted as indicated:

- a) "The Contract" means the agreement entered into between the Owner and the Contractor, as recorded in the contract form signed by the parties, including all the attachments and appendices there to and all documents incorporated by reference therein.
- b) "The Contract Value" means the amount payable to the Contractor under the contract for the full and proper performance of its contractual obligations.
- c) "Contract Data" means any information provided in the Tender document and agreed to by the Contractor.
- d) "The Work" means all labor, materials, tools and plant, equipment including government taxes and transport, that may be required in preparation of and for and in the full and entire execution and completion of "the Work".
- e) "Services" means services ancillary to the execution of the work such as transportation and insurance, and any other incidental services, such as installation, commissioning, provision of technical assistance, training and other obligations of the Contractor covered under the contract.
- f) "GCC" means the General Conditions of Contract contained in this section.
- g) "SCC" means the Special Conditions of Contract.
- h) "The Owner" means the organization getting the work done, and or its representative
- i) "The Contractor" means the individual or the firm executing the work.
- j) "The Project Site" where applicable, means the place or places named in SCC.
- k) "Day" means calendar day.

#### **2.0 Interpretation and Application**

**2.1** These general conditions shall apply to the extent that provisions in other parts of the contract do not supersede them.

**2.2** In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Owner will provide instructions clarifying queries about the Conditions of Contract.

**2.3** If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended completion date are for the whole of the Works.

### **3.0 Standards**

**3.1** The works executed by the Contractor should be carried out in most professional manner, both as regards material and otherwise, in every respect, in strict accordance with the Technical Specifications. All materials and workmanship shall so far as procurable be of the respective kinds described in the priced schedule of quantities and/ or specifications and in accordance with the Owner's instructions, and the Contractor shall upon the request of the Owner, furnish them with all invoices, accounts; receipts and other vouchers to prove that the material procured complies therewith. When no applicable standard exist, the work shall be carried out as per the directions of the Owner. The Contractor shall at his own cost arrange for and / or carry out any test of materials which the Owner may require. In case of discrepancies in tender wording as regards the specifications of materials workmanship etc., written instructions will supersede the tender wording unless otherwise mentioned.

**3.2** The Owner in their absolute discretion from time to time shall issue further drawings and/ or written instructions, details, directions and explanations which are hereafter collectively referred to as "the Owner's instructions" in regard to: -

- a) The variation or modification of the design quality or quantity of works or the addition or omission on any work.
- b) Any discrepancy in the drawings or between the schedule of quantities and / or drawings and /or specifications/ dimensions etc.
- c) The removal and / or re-execution of any works executed by the Contractor.
- d) The removal from the site of any materials brought thereon by the Contractor and the substitution of any other materials therefore / or rejection of the material brought on site.

### **4.0 Use of Contract Documents and Information**

**4.1** The Contractor shall not, without the Owners' prior written consent, disclose the contract or any provision thereof, or any specifications, plan, drawing, pattern, sample or information furnished by or on behalf of the Owner in connection therewith, to any person other than a person employed by the Contractor in performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far, as may be necessary for purposes of such performance.

**4.2** The Contractor shall not, without the Owner's prior written consent make use of any document or information enumerated in Para 5.1 except for the purposes of performing the contract.

**4.3** All documents included but not limited to contract agreement shall remain the property of the Owner and shall be returned (in all copies) to the Owner on completion of the Contractor's performance under the contract, if so required by the Owner.

**5.0 Performance Guarantee**

**5.1** Within 15 days from the date of PO/WO of the contract, the Contractor shall furnish performance guarantee in the form of a bank guarantee to the Owner, of the amount specified in the Special Conditions of Contract / General instructions /Schedule of fiscal aspects. The proceeds of the performance guarantee shall be payable to the Owner as compensation for any loss or dues resulting from the Contractor's failure to complete its obligations under the contract.

**5.3** The performance guarantee shall be in the form of bank guarantee from nationalized bank.

**5.4** The performance guarantee shall be discharged by the Owner and returned to the Contractor on completion of the work and recording of the completion certificate.

**5.5** 10% of the contract / approved tender value in the form of bank guarantee valid for period till completion of work from nationalized bank as per YPS PATIALA approved format.

**6.0 Program and Reporting**

**6.1** The contractor shall furnish to the Owner a bar chart laying down weekly targets to complete the project within stipulated time for approval within fifteen days from the date of receipt of notification of PO/WO. Weekly progress report shall be furnished to the Owner confirming the progress.

**7.0 Assignment and Sub-contracting**

**7.1** The whole of the works included in the Contract shall be executed by the contractor and the contractor shall not directly or indirectly transfer, assign or underlet the contract or any part, share or interest therein without the written consent of the Owner.

**7.2** No sub-contracting shall relieve the Contractor from the full and entire responsibility of the Contract or from the active superintendence of the work during their progress.

**8.0 Contractor to provide everything necessary for proper execution of work**

- 8.1** The Contractor shall provide everything necessary for the proper execution of the works according to the intent and meaning of the drawings, priced schedule of quantities and specifications taken together whether the same may or may not be particularly shown or described therein provided that the same can reasonably be inferred there from. If the Contractor finds any discrepancy therein he shall immediately and in writing refer the same to the Owner whose decision shall be final and binding. Further, if any sample(s) of material(s), fittings, fixtures or finished item(s), to be used in the works, has/have been called for from the contractor, no work related to it/these shall be executed unless the same has/ have been approved by the Owner failing which no payment shall be made to the contractor on this account. Any sample, duly approved by the Owner shall become part of the supply to be used in "the works".
- 8.2** The Contractor shall supply fix and maintain at his cost, during the execution of any works, all the necessary power supply, water supply, scaffolding, watching and lighting by night as well as by day, required not only for the proper execution but also for protection of the public and the safety of any adjacent roads, streets, pavements, walls houses, building and other erections, matters or things.
- 8.3** Throughout the execution of the work, the Contractor or his representative duly authorized and fully responsible and technically conversant with the work under this agreement, acting on his behalf shall be available at the site for supervising the work. Any material, T & P brought to the site for bona fide use of the Project shall not be removed/ shifted from the site without the prior written permission of the owner.
- 8.4** Whenever required by the Owner the Contractor shall provide drawings / details before execution of work and get them approved by the Owner.
- 8.5** Wherever the specifications of any item indicate the usage of approved equivalent of any material, the Contractor shall get the sample of the equivalent material approved from the Owner before execution. The approval of the equivalent material is entirely at the discretion of the owner.
- 9.0** The contractor shall not be allowed to construct huts for accommodation of his employee or workmen, within the site area. The contractors employees or workmen will not be allowed to stay overnight at the site area.
- 9.1** The security of the contractor's equipment and materials is his own responsibility. The Owner accepts no liability for loss or damage to the contractor's plant, tools and tackles & materials.
- 9.2** The materials issued to the contractor by the Owner will remain under the custody of contractor as a trustee. However, title on the same will remain with the Owner. The contractor will be responsible for loss or damage to such materials and shall preserve them in good working conditions as required for the contract and good execution practices till such time that they are incorporated in the works and erected, aligned and fully installed in position and handed over to the Owner. In case the Owner feels that arrangements made by the contractor are not

adequate he shall so advise the contractor and the contractor shall promptly take corrective action. In case the contractor fails to take corrective action, Owner shall take such corrective actions and recover the cost thereof from the contractor's bills. Accounts of such material on completion of work shall be rendered and surplus material returned to the Owner as per instructions of Owner.

- 9.3** The contractor shall clear away periodically or as instructed by Owner any rubbish, scrap materials, etc. and dump the same in the authorized dump sites notified by local authority or area indicated by the Owner. All construction materials shall be neatly stacked in an orderly manner as directed by the Owner and care shall be taken to allow proper access to workmen and easy movement of men, vehicles, cranes and materials.
- 9.4** The contractor shall not permit the entry to the site of any person not directly connected/concerned with the work without first having obtained the written permission of Owner.
- 9.5** All items such as instructions and other pertinent data regarding erection/commissioning and maintenance should be typed and classified for transmittal in a manner approved by the Owner.
- 9.6** All employees of the contractor shall conform to rules of conduct, etc. established; failure to do so will be sufficient cause for removal of such person from the site.
- 16.0** The hours of work at the site shall be decided by the Owner and contractor shall adhere to the same.
- 16.1** All contractors' employees shall wear safety shoes, helmet, goggles, hand gloves, nose masks and any other required personal protection equipment such as identification marks as may be provided by contractor on work site and duly approved by Owner.

## **17.0 Working and Safety Regulations**

- 17.1** The contractor shall observe all statutory, safety, and legal requirements / regulations issued by Central and State Governments applicable to the work as well as any local regulations applicable to the site.
- 17.2** The contractor has to fulfill the safety obligations at site and ensure that all safety equipment required for the execution of the work is available and used by the workmen at site.
- 17.3** Required safety signage and other requirement as per safety norms must be compiled as per the instructions of the Owner.
- 17.4** A qualified person in charge of safety should be posted at the site by the contractor to take care of the safety related issues during the execution period with regard to workmen and material. Failure to employ the safety person will invite suitable deductions from the bills.
- 17.5** The contractor shall be responsible for the provision of all safety notices safety equipments including the safety gadgets for his workmen required by both the relevant legislation and such as the Owner may deem necessary. While working at heights, safety belts, nets, and safety helmets shall necessarily be used.
- 18.0 Particular attention is drawn to the following:** In case of accident, the Owner shall be informed in writing forth with and First-Aid, Hospitalization shall be provided by the Contractor. The contractor shall strictly follow regulations laid down by Govt. and State authorities in this regard and all cases are to be defended By the Contractor. The Owner shall not entertain any insurance claims.
- 18.1** Compliance with all electricity regulations should be ensured.
- 18.2** Compliance with statutory requirements for inspection and test of all lifting appliances and auxiliary lifting gear is to be ensured.
- 18.3** Staircase, doors or gangways shall not be obstructed in any way that will interfere with means of access of escape.

## **19.0 Contractor's Risks**

- 19.1** All risks of loss or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract are the responsibility of the Contractor.

**19.2** The Contractor shall be responsible for injury to persons if any, animals or things and for all damages to the structural and/or decorative part of property which may arise from the operations or neglect of himself or of any sub-contractor or of any of his or sub- Contractor's employees whether such injury or damage arises from carelessness accident or any other causes whatsoever in any way connected with the carrying out of the Contract. This clause shall be held to include inter alia any damage to buildings, whether immediately adjacent or otherwise and any damage to roads, footpaths, or ways as well as all damage caused to the buildings and the work forming the subject to this Contract by frost, rain or other inclemency of the weather. The Contractor shall indemnify the Owner and hold him harmless in respect of all and any expenses arising from any such injury or damage to persons or property as aforesaid and also in respect of any claim made in respect of injury or damage under any acts of Government or otherwise and also in respect of an award of compensation or damages consequent upon such claim. The contractor shall make good all damages of every sort mentioned in the Clause, as to deliver up the whole of the Contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties.

**20.0 Insurance**

**20.1** The Contractor shall provide, in the joint names of the Owner and the Contractor, Insurance cover from the Start Date to the completion of work and handing over to the owner for the amounts and deductibles stated in the Contracted Amount for the following events which are due to the Contractor's risks and shall be covered under respective policies as under:

a) Contractor's All Risk Policy.

**20.2** Third Party Insurance for four consecutive occurrences, The contractor shall provide workmen compensation policy, obtained in his name.

**21.0 Contractor to remove all scrap / unwanted material etc immediately**

**21.1** All debris, packing materials or other matter shall be at once carted away by the contractor out of the premises/ site intimating the concerned authorities. Any material brought on site if found unsuitable / surplus shall be removed from site at once by the Contractor intimating the concerned authorities.

**22.0 Inspections by Owner**

**22.1** The representative of the Owner at all times have free access to the works and /or to the workshops, factories or other places where materials are being prepared or executed for the Contract and also to any place where materials are lying or from which they are being obtained. No person except the representatives of Public authorities shall be allowed on the work at any time without the written permission of the owner. If any work is to be done at a place other than the site of the works, the Contractor shall obtain written permission of the owner for doing so.

- 22.2** The owner and their representatives shall have the right to test and/ or inspect the works to confirm their conformity to the contract, at all times, whenever in progress either on the site on the Contractor's premises wherever situated or any firm or company where work in connection with this contract may be in hand. All records, registers or documents relating to the works including materials used on works shall be kept open to the inspection of the Owner or his Authorized representative.
- 22.3** The Contractor shall get the quality of work done inspected for material and workmanship at different stages of execution as per instructions given by the owner or their representative from time to time. Any item of work done which is found not conforming to the Contract shall be rejected by the owner. The decision of the owner in such cases shall be final.
- 22.4** The inspections and tests may be conducted on the premises of the Contractor or at the Project site. When carried out on the premises of the Contractor or its sub-Contractor(s), all reasonable facilities and assistance including access to drawings and production data shall be furnished to the inspectors at no charge to the Owner.
- 22.5** Should any inspected items of work fail to conform to the specifications, the Owner shall communicate them and the Contractor shall either replace them or make all alterations necessary to meet specification requirements free of cost to the Owner.
- 22.6** The Contractor shall offer the Engineer or any representative of Owner every facility and assistance for examining the works and materials. The Engineer or any representative of the Owner shall have power to give notice to the Contractor or to his staff, of non-approval of any work or materials and such work shall be suspended or the use of such materials shall be discontinued until the decision of the owner. Such examinations shall not in any way exonerate the contractor from the obligations to remedy any defects which may be found to exist at any stage of the work or after the same is completed.
- 23.0 Claims for Extra or for Deviations**
- 23.1** The Owner shall not be responsible for the payment of any claim for extra work not included in the contract nor the Contractor shall be entitled to claim any addition to the contract sum in respect of any changes or alterations in the materials used unless the same shall have been ordered or sanctioned, as the case may be, in writing by the Owner.
- 24.0 Removal of Imperfect Work**
- 24.1** If, it shall appear that the work has been executed with unsound, imperfect or unskilled workmanship, or with material of any imperfect or any inferior quality or otherwise not in accordance with the contract document, the Contractor shall at his own cost rectify, reform, remove, or reconstruct the same, either in the whole or in part, as may be directed by the Owner, whether or not the value of any such work or materials shall have been included in any payment made to the Contractor.
- 24.2** The Contractor shall remove all debris etc., clean the floors and hand over the site quite clean on completion of the work to the satisfaction of the Owner.

**25.0 Delay in the Contractor's performance**

**25.1** Execution of the work and performance of the services shall be done by the Contractor in accordance with the time schedule specified by the Owner in the Notice for Invitation of Tenders.

**25.2** If, at any time during performance of the contract, the Contractor should encounter conditions impeding timely execution of the works and performance of services, the Contractor shall promptly notify owner/ the Consultants in writing of the fact of the delay, its likely duration and its cause(s). As soon as possible, after receipt of the Contractor's notice, the owner/Consultants shall evaluate the situation and may, entirely at its discretion, extend the Contractor's time for performance with or without liquidated damages.

**26.0 Liquidated Damages**

**26.1** If the Contractor fails to execute any or all of the works or to perform the services within the period(s) specified in the contract, the Owner shall deduct from the contract value, as liquidated damages, a sum specified in the SCC for each week or part thereof delay until actual completion or performance, up to a maximum deduction of the percentage specified in SCC. Once the maximum is reached, the Owner may consider termination of the contract. The pro-rata progress envisaged and expected from the contractor shall be maintained, time being the essence of the contract.

**27.0 Force Majeure**

**27.1** The Contractor shall not be liable for forfeiture of its performance security, liquidated damages or termination by default, if and to the extent that, its delay in performance or other failure to perform its obligations under the contract is the result of an event of Force Majeure.

**27.2** For purposes of this clause, "Force Majeure" means an unforeseeable event beyond the control of the Contractor and is not because of the Contractor's fault or negligence. Such events may include acts of the Owner either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics.

**27.3** If a Force Majeure situation arises, the Contractor shall promptly notify the Owner in writing of such conditions and the cause thereof. Unless otherwise directed by the Owner in writing, the Contractor shall continue to perform its obligations under the contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

**28.0 Termination by Default**

**28.1** The Owner may without prejudice to any other right or remedy by a written notice (of fifteen days) of default sent to the Contractor, terminate the contract in whole or part:

- a) If the Contractor fails to complete any or all of the works within the period(s) specified in the NIT or any amendment thereof, or within any extension thereof granted by the Owner, or
- b) If the Contractor fails to perform any other obligation(s) under the contract,

**28.2** In the event, the Owner terminates the contract in whole or in part, the Owner may procure, upon such items and in such manner as it deems appropriate, works or services similar to those unexecuted and the Contractor shall be liable to the Owner for any excess costs for such similar work or services. However, the Contractor shall continue the performance of the contract to the extent not terminated.

**29.0 Termination for Insolvency**

**29.1** The Owner may at any time terminate the contract by giving written fifteen days notice to the Contractor, if the Contractor becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the Contractor, provided such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the Owner.

**30.0 Termination for Convenience**

**30.1** The Owner, by written notice of fifteen days sent to the Contractor, may terminate the contract, in whole or in part, at any time for its convenience. The notice shall specify that the termination is for Owner's convenience, the extent to which performance of the Contractor under the contract is terminated, and the date upon which such termination becomes effective. The items of work those are complete and ready after the Contractor's receipt of notice of termination shall be accepted, if completed within the notice period, by the Owner at the contract terms and values. For the remaining works, the Owner may elect.

- a) To have any portion completed at the contract terms and value and/or
- b) To cancel the remainder and pay to the Contractor an amount, finalized by the Owner, for partially completed works and for materials and parts previously procured by the Contractor.
- c) The contractor shall obtain written permission from the owner to complete the incomplete items of work during the notice period.

**31.0 Resolution of Disputes**

**31.1** The Owner and the Contractor shall make every effort to resolve amicably by direct informal negotiations any disagreement or dispute arising between them under or in connection with the contract. If, after thirty (30) days from the commencement of such informal negotiations, the Owner and the Contractor have been unable to resolve amicably a contract dispute, either party may require that the dispute be referred for resolutions to the formal mechanisms specified in the SCC. These mechanisms may include but are not limited to, Arbitration in accordance with rules of Arbitration Act and award made in pursuance thereof shall be binding on both the parties.

**32.0 Governing law**

**32.1** The contract shall be governed by the laws of The Union of India for the time being in force. All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen in Patiala and only the courts in Patiala alone shall have exclusive jurisdiction to determine the same.

**33.0 Notices**

**33.1** Any notice given by one party to the other pursuant to this contract shall be sent to other party in writing to the other party's address specified in SCC. A notice shall be effective on the date on which it is delivered, or on the notice's effective date, whichever is later.

**34.0 Dismissal of workmen**

**34.1** The contractor on request from the Owner, immediately dismiss from the works any person employed by him who may be found in the opinion of the Owner to be unsuitable or incompetent or who has shown misconduct.

**35.0 Working Hours**

**35.1** Normal working hours shall be from 9.00 a.m. to 6.00 p.m. Any works of important nature should not be carried out on Sundays, Holidays and during nights. However permission to work beyond normal working hours can be granted by the Owner in exceptional circumstances to achieve the target schedule of completion.

## **B. TIME CONTROL**

### **36.0 Programme**

**36.1** Within the time stated in the Contract Data the Contractor shall submit to the Owner for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the works, along with weekly cash flow forecast.

**36.2** An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.

**36.3** The Contractor shall submit to the Owner, for approval, an updated Program at intervals no longer than the period as stated in the clause. If the Contractor does not submit an updated Program within this period, the Owner may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue program has been submitted.

**36.4** The Owner's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the owner again at any time. A revised Program is to show the effect of Variations.

**36.5** At any stage of work, Owner may award any item/part of item of work to contractor's workman/ external agency, if in their opinion, the progress of work is suffering because of that. The work done will be added to the Contractor's bill and the amount paid for the job will be deducted from the Contractor's account.

### **37.0 Delay and Extension of time**

If in the opinion of the Owner the work be delayed:

**(a)** by force majeure **or**

**(b)** by reason of any exceptionally inclement weather **or**

**(c)** by reasons of owner's instruction **or**

**(d)** in consequence of the contractor not having received in due time necessary instructions from the Owner for which he shall have specially applied in writing **or**

**(e)** from other cause which the Owner may certify as beyond the control of the contractor the contractor shall request for approval by the Owner a fair and reasonable extension of time for completion of the Contract works. In case of strike or lockout the contractor shall as soon as may be given written notice thereof to the Owner, but the contractor shall nevertheless constantly use his endeavors to prevent delay and shall do all that may reasonably be required to the satisfaction of Owner to proceed with the work.

**38.0** The Contractor shall offer the Engineer or any representative of Owner every facility and assistance for examining the works and materials. The Engineer or any representative of the owner shall have power to give notice to the Contractor or to his staff, of non-approval of any work or materials and such work shall be suspended or the use of such materials shall be discontinued until the decision of the owner. Such examinations shall not in any way exonerate the contractor from the obligations to remedy any defects which may be found to exist at any stage of the work or after the same is completed.

39.0 The contractor shall maintain a site order book at site for the purpose of quick communication between the contractor and owner. Any communication relating to the work may be conveyed through site order book. Such a communication from one party to other shall be deemed to have been adequately served in terms of contract. Each site order book shall have machine numbered pages in triplicate, and shall be carefully maintained and preserved by the contractor, and shall be made available to the owner as and when demanded. Any instructions which the Owner may like to issue to the contractor or the contractor may like to bring to the owner two copies of such instructions shall be taken from the site order book and will be handed over to the Owner and the third copy will be retained with contractor.

**40.0 Infrastructure**

**40.1** For storage of materials, contractor has to provide at his own cost sufficient fenced and covered appropriate area on site for storage of above materials with lock and key arrangement.

**40.2** Contractor to provide required quantity of portable water for his workers and staff.

**41.0 Governing language**

**41.1** The contract shall be written in English language. All correspondence and other documents pertaining to the contract that are exchanged by the parties shall be written in the same language.

**C. QUALITY CONTROL**

**42.0 Identifying Defects**

**42.1** The Owner shall check the Contractor's work and notify the Contractor of any defects that are found. Such checking shall not affect the Contractor's responsibilities. The Owner may instruct the Contractor to search for a defect and to uncover and test any work that the Owner consider may have a defect.

**43.0 Correction of Defects**

**43.1** The Owner shall give notice to the Contractor of any defects before the end of defects liability period, which begins at Completion and is defined in the Contract Data. The defects liability period shall be extended for as long as defects remain to be corrected.

**43.2** Every time notice of defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Owner's notice.

**44.0 Uncorrected Defects**

**44.1** If the Contractor has not corrected a defect within the time specified in the Owner's notice, the Owner will assess the cost of having the defect corrected, and the owner will realize the cost of rectification from the contractor's bill.

**45.0 Schedule of Quantities:**

**46.1** The Schedule of Quantities shall contain items for the 40kwp roof top solar grid connected and associated works specified in the tender i.e., installation, testing, and commissioning work to be done by the Contractor.

**46.2** The Schedule of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the priced Schedule of Quantities for each item.

**47.0 No escalation shall be payable on any account.**

## **D: FINISHING THE CONTRACT**

**48.0 Completion Certificate**

**48.1** The Contractor shall request the Owner to issue a Certificate of Completion of the Works and the Owner will do so upon deciding that the Work is completed.

**49.0 Taking Over**

**49.1** The Owner shall take over the Site and the Works after Completion, subject to satisfaction of owner in regard to completion of work. Before handing over the site, the contractor must obtain a site clearance certificate from the Owner.

**50.0 No Claim Certificate**

**50.1** No claim certificate shall be submitted by the Contractor as per YPS PATIALA format along with the final bill (if the final bill is correct and complete).

**51.0 Taxes**

**51.1** Taxes to be deducted at source and charges for WCT/ Cess will be issued to the contractor. The contractor will be required to deliver the cheque to the concerned authorities, and the acknowledgement is to be deposited with YPS PATIALA.

**VOL – III**

**SPECIAL CONDITIONS  
OF  
CONTRACT (SCC)**

## **SPECIAL CONDITIONS OF CONTRACT (SCC)**

The following Special Conditions of Contract are supplementary, to the General Conditions of Contract. Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions of Contract.

### **1.0 DEFINITION**

(A) Owner means

Director, Yadavindra Public School Patiala, Stadium Road, Patiala, Punjab 147001

Site means the project site situated at YPS , Stadium Road, Patiala, Punjab 147001

### **2.0 PERFORMANCE GUARANTEE FOR EXECUTION OF CONTRACT**

**2.1** Within fifteen days (15) from date of PO / WO, the Contractor shall furnish Performance Guarantee to the Owner amounting to 10% of the accepted Tender Value in the form of Bank guarantee from nationalized bank. The (Earnest Money Deposit) EMD shall be adjusted against the security deposit.

**2.2 Release of Performance Guarantee for execution of contract:** 100% after the completion of work and issuance of completion certificate by the Owner.

**2.3** An Agreement will be executed after submission of Performance Guarantee as per YPS PATIALA format.

### **3.0 PAYMENTS**

Following terms of payment shall be applicable –

#### **3.1 Security Deposit (SD)**

a) Security@ 5% will be retained from the running bills and the final bill of the contractor. The earnest money shall be converted into security deposit, so that total security deposit including the earnest money shall amount to 5% of the work done, which will be returned 2.5% after 6 months of actual completion of work. Remaining half will be released after successful completion of the defect liability period. The contractor is eligible for refund of full security deposit if the defects in workmanship and quality of work are attended by the contractor. Failing which the cost of rectification of defects shall be recovered from security deposit. The contractor shall obtain no defects certificate from concerned YPS PATIALA staff before claiming the refund.

b) No Interest is payable on the Security Deposit.

**3.2 Payment Terms – Supply of Materials:** 30% accepted BOQ item rate of purchase order after satisfactory acceptance by YPS PATIALA /Owner of the supplied materials along with the relevant following documents mentioned :

**I) Deduction:-**

- a) Statutory deductions like TDS, VAT (WCT), and service tax if any shall be deducted.
- b) Adjustment of any excess / short payment made in the earlier bills, at the time of making payments.
- c) Value of chargeable materials if any issued by the Owner.
- d) Any other recovery if due as per tender terms & conditions.
- e) 5% of the bill value as Security Deposit.

**II) Documents:-**

- a) Computerized detailed measurements, Running Accounts Bills and Final Bill will be Prepared by contractor and submitted to YPS PATIALA for verification and approval.
- b) Document for claiming subsidy from MNRE, if any, should be submitted to YPS PATIALA for release of first RA bill.
- c) YPS PATIALA gate entry documents.
- d) Relevant test, type test, joint inspection reports warranty and guarantee Certificate for the items supply as per quality criteria mentioned tender document.
- e) Copy of Performance guarantee for contract execution from nationalized bank valid till completion of work for 10% of purchase order value.
- f) GST Service Tax registration number.
- g) Indemnity Bond in standard pro forma to indemnify the Owner against all risks arising during the performance of the contract.
- h) Challans / receipts of taxes paid to statutory authorities i.e., labor cess, VAT (WCT) etc.
- i) A Certificate towards the effect that minimum Technical and Safety man power was employed for the work execution Certified by the YPS PATIALA representative as per the Tender Clauses.
- j) Undertaking for compliance of all labor laws.

**3.3 Payment of Bills for installation, erection, testing, integration, successful commissioning of integrated system in total and ready for handing over to YPS PATIALA :** 45% of the Bill amount for the materials quoted will be paid after joint inspection / measurements by the Owner for installation, erection, testing, integration, successful commissioning of integrated system in total and ready for handing over to YPS PATIALA by the contractor and submission of following document :

**I) Deduction:-**

- a) Deduction of the Value of chargeable materials if any issued by the Owner.
- b) Statutory deductions like TDS, VAT (WCT), and service tax if any.
- c) Any other recovery if due as per tender terms & conditions.
- d) 5% of the bill value as Security Deposit.
- e) Adjustment towards any excess / short payment made in the earlier bills.

**II) Document:-**

- a) Relevant test, type test, joint inspection reports warranty and guarantee Certificate for the items installed, integrated & commissioned as per quality criteria mentioned tender document.
- b) YPS PATIALA gate entry documents if any.
- c) MNRE –Govt of India format project completion certificates / documents to YPS PATIALA
- d) Computerized detailed measurements, Running Accounts Bills and Final Bill will be Prepared by contractor and submitted to YPS PATIALA for verification and approval.
- e) A Certificate issued by the YPS PATIALA that total supply and erection works are complete in all aspects.

**3.4 Payment of Bill – Performance testing of total integrated system – final Payment / bill:** Balance 25% of the materials bill shall be paid after performance testing of total integrated system for two months in all respect.

The final bill complete in all respect shall be submitted by the contractor within 60 days from the completion of the work. The bill should be accompanied with the following documents.

**I) Deduction:-**

- a) Statutory deductions like TDS, VAT (WCT), and service tax if any shall be deducted YPS PATIALA reserves the right to adjust any excess / short payment made in the earlier bills, at the time of making payments.
- b) 5% of the bill value as Security Deposit.
- c) Adjustment of any excess / short payment made in the earlier bills, at the time of making payments.
- d) Electricity and Water will be supplied by the school.
- e) Value of chargeable materials if any issued by the Owner.

**II) Document:-**

a) Final acceptance certificate issued by YPS PATIALA /Owner.

**3.5 Defects Liability Period:** 12 calendar months from the date of Issue of Final completion certificate/Acceptance of work by YPS PATIALA.

**3.6 Increase in cost:** Quoted prices are firm and no escalation charges on any account are allowed in this work. No claim will be entertained on this account in future.

**3.7 Disallowance of payment:**

If payment has been made for any item but later on some defect is noticed, Owner is authorized to disallow payment of the subsequent bill till rectification / replacement of the item.

**4.0 ESCALATION**

**No Escalation shall be paid on any account.**

**5.0 LIQUIDATED DAMAGES**

0.5% per week of delay up to a maximum of 5% (Five percent) of the Contract value from the stipulated date of completion.

**6.0 NOTICES**

For the purpose of all notices, the following shall be the address of the Owner and the Contractor.

Owner:

The Director

Yadavindra Public School, Stadium Road, Patiala, Punjab 147001

Contractor: \_\_\_\_\_  
\_\_\_\_\_

(To be filled in at the time of Signing of the Contract)

## **7.0 LABOUR**

- 7.1** The Contractor shall make his own arrangements for the engagement of all staff and labor, local or other, and for their payment, housing, food, transport etc. No labor to stay at site.
- 7.2** The Contractor shall, if required by the owner deliver to the owner a return in detail, in such form and at such intervals as the owner may prescribe, showing the staff and the numbers of the several classes of labor from time to time employed by the Contractor on the Site and such other information as the owner may require.
- 7.3** Compliance with labor regulation: During continuance of the contract, the Contractor and his sub Contractors shall abide at all times by all existing labor enactments and rules made there under, regulations, notifications and bye-laws of the State or Central Government or local authority and any other labor law (including rules), regulation by laws that may be passed or notifications that may be issued under any labor law in future either by the State or the Central Government or the local Authority. The Contractor shall keep the Owner indemnified in case any action is taken against the Owner by the competent authority on account of contravention of any of the provisions of any Acts or rules made there under, regulation or notifications including amendments. If the Owner is caused to pay or reimburse, such amount as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules /regulations including amendments, if any, on the part of the Contractor, the owner shall have the right to deduct from any money due to the Contractor including his amount of performance security. The Owner shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Owner
- 7.4** The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Owner at any point of time.
- 7.5** No labor shall stay at site. Temporary storage space provision should be made by contractor.
- 7.6** The rates shall be complete in all respects i.e. inclusive of all taxes, local taxes, work contract tax, Insurance charges nothing on any account shall be paid over the approved rate.
- 7.7** All specialized and specific jobs shall be carried out by approved agencies/vendors only.
- 7.8** The Contractor shall arrange temporary drinking water and sanitation facilities for his workmen.
- 7.9 Fair Wage Clause**
- I. The contractor shall pay not less than fair wages to laborers engaged by him on the work.
  - II. "Fair" wages means wages whether for time or piecework notified by the Government from time to time for the locality of work.

- III. The contractor shall notwithstanding the revisions of any contract to the contrary cause to be paid to the labor directly engaged on the work including any labor engaged by the sub-contractor in connection with the said work, as if the laborers had been directly employed by him.
- IV. In respect of labor directly or indirectly employed in the works for the purpose of the contractor's part of the agreement the contractor shall comply with the rules and regulations on the maintenance of suitable records prescribed for this purpose from time to time by the Government. He shall maintain his accounts and vouchers on the payment of wages to the laborers to the satisfaction of the Owner.
- V. The Owner shall have the right to call for such record as required to satisfy himself on the payment of fair wages to the laborers and shall have the right to deduct from the contract amount a suitable amount for making good the loss suffered if any by the worker or workers by reason of the "fair wages" clause to the workers.
- VI. The contractor shall be primarily liable for all payments to be made and for the observance of the regulations framed by the Govt., from time to time without prejudice to his right to claim indemnity from his sub-contractors.
- VII. As per contract labor (Regulation and abolition) Act. 1970 the contractor has to produce the license obtained from the licensing officers of the labor department along with the tender. Any violation of the conditions above shall be deemed to be a breach of his contract.
- VIII. Equal wages are to be paid for both men and women if the nature of work is same and similar.
- IX. The contractor shall arrange for the recruitment of skilled and unskilled labor local and imported to the extent necessary to complete the work within the agreed period as directed by the Owner.

## **8.0 SAFETY MEASURES**

- I. The contractor shall take necessary precautions for safety of the workers and preserving their health while working in such jobs, which require special protection and precautions. The following are some of the measures listed but they are not exhaustive and contractor shall add to and augment these precautions on his own initiative where necessary and shall comply with directions issued by the Owner or on his behalf from time to time and at all times.
- II. Providing protective foot wear, Goggles, nose masks, electrical hand Gloves, helmet to the workers as per the site requirement.
- III. Getting the workers in such jobs periodically examined for chest trouble due to too much breathing in to fine dust.

- IV. Taking such normal precautions like fencing and lighting in excavation of trenches, working at heights, during night time etc. as per the site requirement.
- V. Supply work men with proper belts, ropes etc., when working in precarious slopes and heights etc. as per the site requirement.
- VI. Avoiding un-insulated electrical wire etc., as they would electrocute the workers.
- VII. Taking necessary steps towards training the workers concerned on the machinery before they are allowed to handle them independently and taking all necessary precautions in and around the areas where machines hoists cable pulleys, rollers, hydraulic tools etc. are working.
- VIII. The Contractor should isolate the work spot by providing safety barricades, Signage boards etc.

## **9.0 FIRE FIGHTING MEASURES**

- a) The contractor shall provide and maintain adequate firefighting equipment and take adequate fire precaution measures for the safety of all personnel and temporary and permanent works and shall take action to prevent damage and destruction by fire of trees shrubs and grasses.
- b) Separate payment will not be made for the provision of fire prevention measures.

## **11.0 RESOLUTION OF DISPUTES & ARBITRATION**

- 11.1** All disputes, other than quality, quantity, workmanship, specification, design, drawing, extension of time and rates for extra items, arising out of or relating to this contract whether arising during the progress of the work or after cancellation, termination, completion or abandonment thereof shall be dealt with as mentioned herein after. The decision of Owner on the above said excepted matters shall be final and binding.
- 11.2** If the contractor considers any work demanded of him to be outside the requirements of the contract or disputes any drawings, record or decision given in writing in connection with or arising out of the contract or carrying out of the work, he shall promptly within 15 days request the Owner in writing for written instruction or decision. If the Contractor is dissatisfied with this decision, the Contractor shall within a period of 30 days from receipt of the decision, give written notice to Director YPS Patiala, Stadium Road, Patiala, Punjab 147001.
- 11.3** for appointment of Arbitrator failing which the said decision shall be final binding and conclusive and not referable to adjudication by the Arbitrator. Except where the decision has become final, binding and conclusive in terms of Sub Para (i) above disputes or difference shall be referred to The Director, YPS Mohali, Punjab, appointed as sole Arbitrator by the Director YPS Patiala.

- 11.4 If the arbitrator so appointed is unable or unwilling to act or resign his appointment or vacates his office due to any reason whatsoever another sole arbitrator shall be appointed in the manner aforesaid. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor.
- 11.5 It is a term of this contract that the party invoking arbitration shall give a list of disputes with amounts claimed in respect of each dispute along with the notice for appointment of arbitrator.
- 11.0 It is also a term of this contract that no person other than a person appointed by such The Director, YPS Patiala, Punjab as aforesaid should act as arbitrator and if for any reason that is not possible, the matter shall not be referred to arbitration at all.
- 11.1 It is also a term of this contract that if the contractor does not make any demand for appointment of arbitrator in respect of any claims in writing as aforesaid within 30 days of receiving the intimation from the Owner that the final bill is ready for payment, the claim of the contractor shall be deemed to have been waived and absolutely barred and YPS PATIALA shall be discharged and released of all liabilities under the contract in respect of these claims.
- 11.2 The arbitration shall be conducted in accordance with the provisions of the Arbitration and Conciliation Act, 1996 (26 of 1996) or any statutory modifications or reenactment thereof and the rules made there under and for the time being in force shall apply to the arbitration proceedings under this clause.
- 11.3 It is also a term of contract that a simple interest of not more than 6% shall be applicable on the award.
- 11.4 The fees of arbitration and cost of proceeding shall be shared equally by both the parties.
- 14.0 QUANTITY OF WORK**  
The quantities mentioned in the purchase order are only approximate in nature i.e., approximate quantified scope. Hence, the contractor **can't claim any compensation towards non-operation of part or total quantities and non-operated items listed in the Purchase Order.**
- 15.0 PROGRESS REPORT**  
Monthly progress report along with photographs of work progress shall be submitted to the Owner before the 2<sup>nd</sup> day of every month.
- 16.0 ACCIDENT OR INJURY TO WORKMEN**
- 16.1 YPS PATIALA shall not be responsible for any injury or loss of life of any worker of the contractor that may take place while on work. Any compensation or expenditure towards treatment for such loss of life or injury shall be the sole responsibility of the contractor.
- 16.2 The contractor is solely responsible for any damage injury or accident that may occur to any of his personnel working under this contract. He will not claim any compensation from YPS PATIALA.

**17.0 PAYMENTS FOR QUANTIFIED ITEMS:** Since the payments are based on actual site measurement, the contractors are advised to procure the materials based on actual site requirement. Payment will not be made for left out and unused materials.

**18.0 TAXES**

**18.1** During the currency of the contract, deduction of TDS as applicable from the gross value of each bill of the contract.

**18.2** The contractor's staff, personnel and labor will be liable to pay personnel income taxes in respect of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations.

**18.3** VAT, service tax and Labor Cess, as per rule will be borne by the contractor. Taxes to be deducted at source and cheques for service tax / WCT / Cess / will be issued to the contractor. The contractor will be required to deliver the cheque to the tax authorities, the acknowledgement of which will be deposited by the contractor with YPS PATIALA along with subsequent bill.

**19.0 MATERIALS ENTRY**

It would be necessary for the contractor to get his materials a gate entry authorization at the YPS PATIALA Main gate duly signed by the duty officer of YPS PATIALA. **These gate entry records must be submitted along with the bills.**

**20.0 DETAILED WORKING DRAWINGS**

**20.1** The Contractor shall prepare his own detailed working drawings and get them approved by YPS PATIALA.

**20.2** Cost of all drawings and details to be furnished by the Contractor shall be deemed to be included in his tendered rates of work. Approval of Drawings etc.. shall not be construed as authorizing additional work or increased cost to the company unless such additional works are authorized in writing by the YPS PATIALA.

**20.3** After installation is completed, 3 sets of As built Drawings shall be prepared in full details along with soft copy in pen drive and submitted to YPS PATIALA.

**21.0 REGULATIONS & STANDARDS**

The installation shall conform in all respects to the Indian Standard Code of Practice for Electrical Installations. It shall also be in conformity with the current Indian Electricity Rules and Regulations and requirements of the local Electric Supply Authority in so far as these become applicable to the installation. Wherever the specifications of this tender document calls for higher standard of material and/or workmanship than those required by any of the above codes and regulations then these specifications shall take precedence over the said regulations and standards.

**22.0 MANUFACTURER'S INSTRUCTIONS**

**22.1** Where manufacturers have furnished specific instructions relating to the materials used and procedural steps in this job, covering points not specifically mentioned in this document, those instructions shall be followed in all cases.

**23.0 APPROVAL FROM Electricity Board (PSPCL):**

**23.1** The contractor shall prepare and submit all the relevant documents, drawings & Test Certificates as per the requirement of Electrical Inspectorate and get the installation approved before commissioning the Electrical system & statutory fee to CEA at actual , will be reimbursed. To this effect original proof should be submitted to YPS PATIALA. Approval is associated with payment releases to contractors as per payment terms.

**24.0 APPROVAL OF SUBSIDY FROM MNRE, GOVT. Of INDIA (IF APPLICABLE)**

**24.1** The contractor shall prepare and hand over all the relevant documents, design, project report, drawings & Test Certificates as per the requirement of MNRE, GOVT. OF INDIA to YPS PATIALA for future usage and claims from Govt.of India. This activity is associated with payment releases to contractors as per payment terms.

**FORM OF PERFORMANCE GUARANTEE / BANK GUARANTEE BOND**

In consideration of the Director, YPS PATIALA (hereinafter called "The Director") having offered to accept the terms and conditions of the proposed agreement between..... and ..... (Here in after called "the said contractor(s)" for the work (Here in after called "the said agreement") having agreed to production of an irrevocable Bank guarantee for Rs \_\_\_\_\_(Rupees .....only) as a security / guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement.

1. We ..... (Here in after referred to as the "Bank") hereby undertake to (Indicate the name of the Bank) pay to the Director an amount not exceeding Rs..... (Rupees..... Only); on demand by the Director.
2. We.....do hereby under take to pay the amounts due and payable (Indicate the name of the Bank) under this guarantee without any demur, merely on a demand from the Director stating that the claimed is required to meet the recoveries due or likely to be due from the said contractor(s). Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this guarantee. However, our liability under thisguarantee shall be restricted to an amount not exceeding Rs ..... (Rupees.....Only)
3. We, the said Bank, further undertake too pay the Director any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any Court or Tribunal relating thereto, our liability under this present being absolute and unequivocal. The payment somade by us under this bond shall be valid discharge of our liability for payment there under, and contractor(s) shall have no claim against us for making such payment.
4. We.....further agree that the guarantee herein containedshall (indicate the name of the Bank) remain in full force and effect during the period that would be taken for the performance of the said agreement, and it shallcontinue to be enforceable till all the dues of the Director under or by virtue of the said agreement have been fully paid, and it's claims satisfied or discharged, or till the Owner, on behalf of the Director, certifies that the terms and conditions of the said agreement have been fully and properly carried out by the said contractor(s),and accordingly discharges this guarantee.
5. We.....further agree with the Director that the Director (Indicate the name of the Bank) shall have the fullest liberty without our consent, and without effecting in any manner our obligations hereunder, to vary any of the terms and conditions of the said agreement or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from the time to time any of the powers exercisable by the Director against the said contractor(s), and to forbear or enforce any of the terms and conditions related to the said agreement, and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said contractor(s) or for any forbearances, act of omission on the part of the Director or any indulgence by the Director to the said contractor(s) or by any such matter or things whatsoever which under the law relating to sureties would, but for this provision, have effectof so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the contractor(s).

7. We.....lastly undertake not to revoke this Guarantee except with (Indicate the name of the Bank) the previous consent of the Director in writing.

8. This guarantee shall be valid up to .....unless extended on demand by the Director notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs.....(Rupees.....only), and unless a claim in writing is lodged with us within six months of the date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged.

Dated the..... day of.....

For .....(Indicate the name of the Bank)

**VOL – IV**  
**SCOPE OF WORK**

## Scope of Work

1. Scope of work will be design, procurement, quality control testing, supply, installation, integration with existing electrical system, commissioning, flawless synchronizing / paralleling with two available grids (i.e. electricity and Diesel generator) performance testing & guarantee and handing over of 90 KWp (50 KWp + 40 KWp at two different sites) grid connected rooftop solar photovoltaic power plant at YPS PATIALA, Patiala with five years of comprehensive maintenance contract.
2. Supply of all components, sub components, spares and tools etc. necessary to make the system complete shall be the responsibility of successful bidder.
3. The installation is to be on the rooftops of SQUASH Court & Junior School building
4. The successful bidder as one of the channel partners shall prepare the detailed project report and bill of materials to YPS PATIALA. Excise Duty Exemption Certificate (EDEC) and Concessional Customs Duty Certificates (CCDC), if applicable will be issued by YPS PATIALA. Purchase Order will be released to the successful bidder.
5. Total erection works and material item supplies should be carried out as per applicable latest CE, IS, IEC & IEEE standards / codes with solar grade with IP 65 / IP66 protections.
- 6. Total Associated Engineering Works (both supply & erection)**
  - a. Electrical:-**
    1. Power cables, communication cables & control cables of Solar grade
    2. Synchronizing / Paralling equipments to achieve flaw less synchronizing with electricity board grid required by YPS PATIALA / owner i.e. 100% utilization solar power.
    3. Lighting arresters, earthing, cable trays, cable trenches, terminations and etc.
    4. Copper cables for power should be laid up to AC junction box and Aluminium cable up to Meter
    5. Earthing with pits with GI strips
      - a. Civil supporting structure.
      - b. Modules.
      - c. Inverters
      - d. DC junction, Distribution & combiner boxes
      - e. AC junction & combiner boxes
      - f. Lighting arrester
      - g. Approval of YPS PATIALA should be obtained on designed drawing before executions

**b. Civil:-**

1. GI structural supports to mount PV panel as per YPS PATIALA design and drawings given along with tender document.
2. Drilling holes 100mm deep in concrete in beams and columns grouting the same with Hilty injectable grout before and after inserting 10mm dia reinforcement and casting RCC (1:2:4) pedestals.
3. Providing, fabricating and laying galvanized structural steel section, plates, nuts washer and bolts, and cable tray as per drawing with thickness of galvanizing of 80 micron.
4. Providing and laying cement plaster and doing water proof treatment around the pedestals to prevent leakage of water.
5. All GI structural steel section should be 'CE' quality certified.
6. The civil & structural works should be carried out as per the civil drawings –enclosed
7. The GI structural YPS PATIALA design is for 150KM / hours wind speed.

**9.0 PSPCL, electrical clearances: YPS PATIALA will sign on application forms.**

- 9.1 Contractor has to co ordinate total related works at PSPCL on behalf of YPS PATIALA, Patiala.
- 9.2 Should submit the PSPCL electrical clearance approval letter from CEA for release of final bill.
- 9.3 YPS PATIALA will reimburse the actual / statutory fee paid by the contractor to CEA for processing the application. Proof of document to this effect to be submitted.

**VOL – V**  
**TECHNICAL SPECIFICATIONS**

## **TECHNICAL SPECIFICATIONS**

### **1.0 INTRODUCTION**

- 1.1 This project proposal for a grid connected rooftop solar photovoltaic plant while aims to reduce the expenditure on energy purchase.
- 1.2 The day time power requirement on holidays is too low, so on around 120 days of the year, ie about one third of the year, the plant will be practically off-load. This means almost 30% of the possible plant output will go waste. So to facilitate effective utilization of this energy output elsewhere and also to financially benefit from exporting this surplus energy, net-metering agreement shall be established with PSPCL.
- 1.3 Roof top area required for installation of the solar modules is estimated at 10 M<sup>2</sup> per KWp, so the requirement is about 9000 sq ft. The Squash Courts and Junior School building at YPS PATIALA together can provide sufficient shadow free roof area.

### **2.0 EXISTING ELECTRICAL SYSTEM**

- 2.1 As per site survey by contractor.

### **3.0 QUALITY AND WORKMANSHIP**

- 3.1 Solar PV modules are designed to last 30 years or more. It is therefore essential that all system components and parts, including the mounting structures, cables, junction boxes, distribution boxes, clamps nuts & bolts and other parts also have a life cycle of at least 25 years. Therefore, all works shall be undertaken with the highest levels of quality and workmanship. During inspection special attention will be given to neatness of work execution and conformity with quality and safety norms. Non-compliant works will have to be redone at the cost of the Installer.
- 3.2 Components and parts used in solar PV systems should conform to the BIS or IEC or other international specifications, wherever such specifications are available and applicable.

### **4.0 SPECIFICATIONS FOR SOLAR PANELS**

- 4.1 The PV modules must conform to the latest edition of any of the following IEC / equivalent BIS Standards for PV module design qualification and type approval as per 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. PV modules must also qualify Salt Mist Corrosion Testing as per IEC 61701 / IS 61701.

**4.2** Each PV module must use a RF identification tag (RFID), which shall be mandatory placed inside the module laminate and must contain the following information.

(i) Name of the manufacturer of PV Module

(ii) Name of the Manufacturer of Solar cells

(iii) Month and year of the manufacture (separately for solar cells and module)

(iv) Country of origin (separately for solar cells and module)

(v) I-V curve for the module

(vi) Peak Wattage,  $I_m$ ,  $V_m$  and fill factor ( FF)  $V_{oc}$ ,  $I_{sc}$  for the module

(vii) Unique Serial No and Model No of the module

(viii) Date and year of obtaining IEC PV module qualification certificate

(ix) Name of the test lab issuing IEC certificate

(x) Other relevant information on traceability of solar cells and module as per ISO 9000 series.

(IX) Module no the module should have IEC certification.

**4.3** (I) PV modules must have performance warrantee for their output peak watt capacity, which should not be less than 93.05% at the end of 10 years and 84.8% at the end of 25 years. Also they must have warrantee of panel for 12 years for workmanship and material.

(II) Make of modules are: BHEL, TATA, Panasonic, Havells, from Indian Public Sector Companies under make in India Programme.

(III) Acceptable optimized peak power of each module is 550 W so as to restrict minimum module capacity to 550W.

**4.4 Features:**

- Superior Module Efficiency as per International Benchmarks.
- Positive Power Tolerance  $\pm 5W$
- PID Resistant with long term reliability.
- Glass with Anti Reflective Coating Improves light transmission.
- Salt mist, Ammonia and Hail Resistant.
- Sustain Heavy Wind & Snow loads (2400 Pa & 5400 Pa).
- IP 67 rated MC4 compatible connectors.
- Excellent Performance in Low light.
- Sand and Dust Storm Resistant.

#### **4.5 Makes: Make in India**

- BHEL, TATA , Panasonic, Havells

**Design:** Acceptable optimized peak power of each module is 550 W So as to restrict minimum module capacity to 550W.

<b>Mechanical Characteristics</b>	
Acceptable optimized peak power of each module is <b>550 W</b> so as to restrict minimum module capacity to <b>550W</b> .	
Length x Width x Thickness (L x W x T) – mm	
Mounting Holes Pitch (Y) – mm	
Mounting Holes Pitch (X) – mm	
Weight (kg)	
Solar Cells per Module (Units) / arrangement	
Solar Cell Type	
Front Cover (Material / Thickness)	
Encapsulate	
Frame Material	
Junction Box (Protection degree / Material)	
Connector	
Cable	
Fire safety class	
Safety application class	
Safety class	
<b>Thermal Characteristics</b>	
Temperature coefficient of Current ( $I_{sc}$ ), $\alpha$ (% / °C)	
Temperature coefficient of Voltage ( $V_{oc}$ ), $\beta$ (% / °C)	
Temperature coefficient of Power ( $P_m$ ), $\gamma$ (% / °C)	
NOCT ( °C)	
Operating temperature range ( °C)	

## **5.0 SPECIFICATIONS FOR GRID-TIE STRING INVERTERS**

- 5.1** The solar grid-tie inverter converts the DC power output of the solar PV modules to grid-compatible AC power and the total output power (AC) of the grid-tie inverters shall match the solar PV plant capacity while achieving optimum system efficiency. Operating ambient temperature range shall be considered at - 10 °C - +60 °C and relative humidity 0 – 95%.
- 5.2** Power Conditioners / Inverters including MPPT (EN 50530) and Protections shall comply Efficiency Measurements as per IEC 61683 / IS 61683 and Environmental Testing as per IEC 60068-2 (1, 2, 14, 30) /Equivalent BIS Std. In case if the Charge controller is in-built in the inverter, no separate IEC 62093 test is required. Additionally the inverters shall conform to the relevant national / international Electrical Safety Standards wherever applicable as per IEC 62109-1, IEC 62109-2 and anti-islanding protection as per VDE 0126- 1-1, IEC 60255.5 / IEC 60255.27 / IEC 62116

**5.3 Communication interface**

The project envisages a communication interface which shall be able to support:

- Real time data logging
- Event logging
- Supervisory control
- Operational modes
- Set point editing

**5.4** Communication System shall be an integral part of inverter. All current values, previous values up to 40 days and the average values of major parameters shall be available on the digital bus.

**5.5** The following parameters shall be measured, displayed and recorded/logged. Daily plotting of graphs for various parameters shall also be available on demand.

- i) 15 minute, Daily, monthly & Annual energy generated by the solar system(kWh)
- ii) Solar system temperature
- iii) Ambient temperature
- iv) AC and DC side voltage and currents
- v) Power factor on AC side
- vi) DC injection into the grid
- vii) Total Current Harmonics distortion in the AC side
- viii) Total Voltage Harmonic distortion in AC side
- ix) Efficiency of the inverter
- x) Solar system efficiency
- xi) Display of I-V curve of the solar system
- xii) Any other parameter considered necessary by supplier of the solar PV system based on prudent practice.

**5.6** Data logger system (Hard ware) and the software for study of effect of various environmental & grid parameters on energy generated by the solar system and various analyses would be required to be provided.

**5.7** The communication interface shall be suitable to be connected to local computer and also remotely via the Web using either a standard modem or a GSM / WIFI modem.

**5.8** **Makes:** TATA, PANASONIC, FRONIOUS, DELTA, POLYCAB

### 5.9 Acceptance:

1. Factory tested for routine & type as per IEC norms in the presences of YPS PATIALA staff along with warranty & guarantees certificates.
2. The supplied inverters should have weighted average efficiency under Indian conditions be minimum 93% and minimum input power under Indian conditions should be above 85%.

### 5.10 Design: Appropriate/optimized inverter wattage /power should be chosen with following points mind:

- To meet the total power requirement based on the roof top available area and also area required for maintenance.
- Maximum Power rating: 50 KWp+ 40 KWp per inverter.
- Maximum decentralization should be achieved, so that at any given time minimum no of strings are down.
- To deliver maximum power for long duration mentioned in tender document with out degradation as per IEC applicable code.
- Approval should be obtained from YPS PATIALA before procurement backed by detailed technical design calculation documents should be submitted to meet the tender document requirements.
- Optimized wattage should be mentioned in the technical bid along with technical design documents to meet the tender document requirements.

### 6.0 Technical Specifications:

Sl. No	Items	Range
1.	Nominal Inverter Output Rating	
2.	MPPT Voltage Range	
3.	AC Output with 50Hz frequency	
4.	Integrated MPPT Solar Regulator	
5.	Minimum Efficiency above 30% input power	
6.	Accuracy of AC voltage control	
7.	Accuracy of frequency control	
8.	Grid frequency Synchronization range	
9.	Maximum Input DC Voltage	
10.	Ambient temperature considered	
11.	Humidity	
12.	Protection of Enclosure	
13.	Grid Frequency Tolerance range	
14.	Grid Voltage tolerance	
15.	No-load losses	
16.	THD	
17.	Type of Loads	

18.	Cooling	
19.	Protections	
20.	Control type	
21.	Certifications Required	
<ul style="list-style-type: none"> <li>• The inverter shall be capable of complete automatic operation including wake-up, to monitor plant performance.</li> <li>• The inverters should comply with applicable IEC / equivalent BIS standard for efficiency measurements and environmental tests as per standard IEC code.</li> <li>• The inverters should be tested from the MNRE approved test centers / NABL / BIS accredited testing – calibration laboratories.</li> <li>• In case of imported power conditioning units, these should be approved by international test houses.</li> </ul> <p><b>Module Technologies where +ve or –ve grounding required needs to be identified by bidder and according selection of PCU needs to be done by the bidder.</b></p>		

## 7.0 DC DISTRIBUTION BOX

7.1 A DC distribution box shall be mounted close to the solar grid inverter. The DC distribution box shall be of IP65 DIN-rail mounting type and shall comprise the following components and cable terminations:

- Incoming positive and negative DC cables from the DC Combiner Box.
- DC circuit breaker, 2 pole (the cables from the DC Combiner Box will be connected to this circuit breaker on the incoming side).
- DC surge protection device (SPD), class 2 as per IEC 60364-5-53.
- Outgoing positive and negative DC cables to the solar grid-tie inverter.

**7.2** As an alternative to the DC circuit breaker a DC isolator may be used inside the DC Distribution Box or in a separate external IP 65 enclosure adjacent to the DC Distribution Box. If a DC isolator is used instead of a DC circuit breaker, a DC fuse shall be installed inside the DC Distribution Box to protect the DC cable that runs from the DC Distribution box to the solar grid-tie Inverter.

## **8.0 DC COMBINER BOX**

1. A DC Combiner Box shall be used to combine the DC cables of the solar module arrays with DC fuse protection for the outgoing DC cable(s) to the DC Distribution Box.
2. DC disconnect switch should be as per IEC 60947-3, DC fuse rating conform to IEC 60269-1, 2, 6.
3. DC disconnect switch provide safety and protection against over currents in any DC voltage photovoltaic applications and PV solar modular.
4. DC fuse protects against reverse currents in dedicated to PV application.

## **9.0 AC DISTRIBUTION BOX**

**9.1** An AC distribution box shall be mounted close to the solar grid inverter. The AC distribution box shall be of IP65 DIN rail mounting type and shall comprise the following components and cable terminations:

- Incoming 3-core / 3.5-core cable from the solar grid-tie inverter.
- AC circuit breaker / isolator, 4-pole.
- AC surge protection device (SPD), class 2 as per IEC 60364-5-53.
- Outgoing cable to the grid / DG interconnection.

**9.2** AC Distribution Board (ACDB) 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 (to evacuate generated power on Saturday, Sunday and holidays to the local grid / state electricity board grid i.e. for Grid Export) All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III or EN 50521 standards.

## **10.0 SURGE PROTECTION**

**10.1** Surge protection shall be provided on the DC side and the AC side of the solar system. The DC surge protection devices (SPDs) shall be installed in the DC distribution box adjacent to the solar grid-tie inverter. The AC SPDs shall be installed in the AC distribution box adjacent to the solar grid-tie inverter.

**10.2** The SPDs earthing terminal shall be connected to earth through dedicated earthing system. The SPDs shall be of type 2 as per IEC 60364-5-53 & NFEN 50539-11

## **11.0 GENERAL SPECIFICATIONS FOR DC & AC DISTRIBUTION BOXES**

**11.1** These specifications cover the requirement of design, supply, installation, testing and commissioning of the DC& AC distribution boxes.

**11.2** The item specified herein, unless otherwise stated shall conform to the relevant and latest revisions of Indian standards and Indian Electricity Rules.

- 11.3** The DC & AC distribution boxes shall be designed for operation in high ambient temperature up to 50 degrees centigrade and high humidity of up to 95% and tropical atmospheric conditions. Means shall be provided to facilitate ease of inspection, maintenance and servicing.
- 11.4** The DC & AC distribution boxes shall be of metal clad, cubicle, outdoor, weather proof, free standing type suitable for mounting on MS frame / concrete platform, with adequate size for mounting the isolator switches/MCBs etc and ease of cable terminations. Dust and moisture ingress protected, the degree of protection shall be IP- 65 as specified in IS-2147.
- 11.5** The sheet steel cubicle shall have hinged front access door with easy operating fasteners. All the doors and covers shall be heavily gasketed to make the compartment dust and moisture tight. Door hinges shall be of concealed type.
- 11.6** The cubicle shall be of minimum 2 mm thick sheet steel. All sheet steel work forming the exterior shall be smoothly finished, leveled and free from flaws. The corners shall be rounded. The minimum thickness of gland plates shall be 3mm.
- 11.7** The bus bars shall be so arranged as to ensure the necessary degree of safety.

Apparatus forming part of the DBs shall have the following minimum clearance.

- i) Between phases – 25 mm,
  - ii) Between phase and neutral – 25 mm,
  - iii) Between phases and earth – 25 mm,
  - iv) Between neutral and earth – 19 mm,
- 11.8** When, for any reason, the above clearances are not available suitable insulation shall be provided.
  - 11.9** All insulating materials used in the construction of the equipment shall be non hygroscopic duly treated to withstand the effect of high humidity, high temperature and tropical ambient service conditions.
  - 11.10** All doors / covers providing access to live parts shall be provided with tool operated fasteners to prevent unauthorized access.
  - 11.11** Provisions shall be made for permanently earthing the frames and other metal parts by two independent connections.
  - 11.12** Metal treatment and finish  
All steel works used in the construction of the DC & AC distribution boxes shall have undergone a suitable rigorous metal treatment process so as to remove oxide scales and rust formation and to facilitate a durable coating of the paint on the metal surfaces and also to prevent the spreading of rust, in the event of the paint film being mechanically damaged.

**11.13** Two coats of anti corrosive primer followed by a finishing coat of epoxy powder coating of the shade 631 of IS: 5 (ie Siemens grey) shall be given. The total thickness of paint shall not be less than 25 micron.

**11.14 Bus Bars**

11.14.1 The bus bars shall be housed in the cubicle at convenient locations with provision for access to the buses from the front. The bus bar shall be suitably rated for the expected short circuit levels. The neutral as well as the earth bus shall be capable of withstanding the above fault level.

11.14.2 Large clearance and creeping distance shall be provided on the bus bar system to minimize the possibility of a fault.

11.14.3 High tension bolts, nuts and spring washers shall be provided at all bus bar joints.

11.14.4 The continuous rating of the aluminum bus bar shall be 0.7A/sq.mm. Maximum temperature of the bus and the connections shall not exceed 85 degrees centigrade. The bus bars shall be of liberal design. The main phase bus bars shall have continuous current rating and the neutral bus bars shall have continuous rating of at 100% of phase bus bars.

11.14.5 All bus bars and tapings shall be provided with color coded heat shrinkable sleeves for phase / polarity identification.

**11.14.6 Installation Testing and commissioning**

The DB boxes shall be installed over the MS frame fixed / grouted on a PCC platform including necessary bolts and nuts. Proper earthing shall be done using two independent GI strip of size 25x3 mm. The MS structure shall be painted with two coats of red oxide primer after cleaning the surfaces thoroughly and two coats of anticorrosive epoxy paint of proper shade as directed by the YPS PATIALA representative.

11.14.7 The pre-commissioning tests as required shall be done and the DB boxes shall be commissioned.

**12.0 Cables for carrying Power and Control**

**12.1** The XLPE power cable shall be 1.1kV grade, heavy duty, stranded copper / aluminum conductor, UV resistant (for outdoors) PVC type. An insulated, galvanized steel wire / strip armored, flame retardant low smoke (FRLS) extruded PVC type ST-1 outer sheathed. The cables shall, in general conform to IS-1554 Part-I & other relevant standards.

**12.2** Control & Data Communication Cables: The cable shall be 1.1kV grades, heavy duty, stranded copper conductor, PVC type A insulated, armoured galvanized steel wire / strip armored, flame retardant low smoke (FRLS) extruded PVC type ST-1 outer sheathed. The cable shall, in general conform to IS-1554 Part-I & other relevant standards.

**12.3** The permissible voltage drop from the SPV Generator to the PCU/inverter shall not be more than 2% of peak power voltage of the SPV power source (generating system). In the light of this fact the cross-sectional area of the cable chosen is such that the voltage drop introduced by it shall be within 2% of the system voltage at peak power.

**12.4** All connections should be properly terminated from outdoor and indoor elements. Relevant codes and operating manuals must be followed.

### **12.5 LAYING OF CABLES**

12.5.1 This specification is intended to cover the requirements of installation and energizing of XLPE power cables.

12.5.2 The power cable and its fixing accessories shall comply with the latest relevant Indian Standards and National Electrical Code.

### **12.6 General**

12.6.1 Cables should be of 1.1Kv grade XLPE insulated unarmored / armored with copper / aluminum conductor conforming to IS 7098/part 1/1988

12.6.2 All relevant factory test reports along with warranty and guarantee should be submitted along with the supply of cables. Cable drums should be stored on a plain vibration-free ground. Drums should be stored and kept in such a way that the bottom of the outer cable coil should not be damaged.

12.6.3 Before the commencement of cable laying, it shall be ensured that only the specified cables are used. It shall be the responsibility of the contractor to check the soundness and correctness of the size of the cable. If any defects are noticed during the process of laying, it shall be brought to the notice of the YPS PATIALA representative.

12.6.4 The material such as bricks, sand, cable route markers of best quality as approved by the YPS PATIALA representative only shall be used for cable laying works.

12.6.5 contractor shall provide all the necessary labor, tools and other requisites at his own cost for carrying out pumping of water and removing of water from trenches, if any, where required.

12.6.6 Installation shall be carried out in a neat manner by skilled, experienced and competent workmen in accordance with standard practices.

12.6.7 While laying the cable, care shall be taken to avoid formation of kinks and also damage to the cable. In the case of cable bends, it shall not have bent radius lesser than 12 times the overall diameter of the cable.

12.6.8 A power cable loop of about five meters length and as directed by the YPS PATIALA representative shall be provided at the following locations.

- a) Near the termination points
- b) Near to the straight through joint

12.6.9 The method of cable laying and routing of cables, shall in every case be as directed by the YPS PATIALA representative

12.6.10 Cable shall be laid in Class 'B' GI pipes at all entry to buildings. Whenever cable passes through GI pipes embedded across the wall in a building, both the ends of the pipe shall be suitably sealed.

12.6.11 Identification tags indicating the size of the cable and feeder designation shall be securely attached at both ends of the cable. Such tags shall also be attached to the cable at intervals of 50 Meters. The material of the tags shall be 25x3mm, Al strip. In case of Al strip, the details should be punched. Cable route markers shall be provided at the intervals of 20M with a minimum of one number route marker. The details of the route markers shall be as per the IS standard. At the locations of straight through joints, necessary joint-markers shall be provided.

12.6.12 When cable runs vertically, it shall be clamped on proper GI cable trays or angle iron frames fixed on walls and are spaced at such intervals as to prevent buckling of the cables. All steel work shall be painted with two coats of red oxide primer after thorough cleaning of surfaces and thereafter finished with suitable anti- corrosive paints and provided with appropriate earthing as per IS.

## **12.7 Cable laid in ground**

12.7.1 MV cables (up to 1.1 KV) shall be laid at a minimum depth of 0.75 M when laid in ground. When cable pass through roads, storm drains etc. they must be protected by either by hume pipe or GI pipe of suitable dimensions.

12.7.2 Excavations of trenches shall be carried out as indicated in the relevant ISstandard. The width of the trench at the bottom shall be 0.4 M for one cable. In case the total number of cables laid in trenches is more than one, then the width shall be such that the spacing between the cables is maintained as in thestandard. Before the cable is laid in the trench the bottom of the trench shall be cleared from stones and other sharp materials and filled with sand layer of 150mm.

12.7.3 While removing the cable from the drum, it shall be ensured that the cable drum is supported on suitable jacks and the drum is rotated to unwind the cable from the drum. The cable should never be pulled while unwinding from the drum. It shall be ensured that the cables are pulled over the wooden rollers placed in the trench at intervals not exceeding 2 meters. At no point of time the cable should touch the ground while pulling, it should be always on the Rollers. Contractor should use latest equipments for unrolling and laying the cable

12.7.4 After placing the cables in the trench it shall be filled in layers. First a 150mm layer of fine sand and a layer of red bricks and then back filling excavated soil ensuring there are no big stones or sharp objects in the backfill and that each layer is well rammed by spraying water and consolidated. The extra earth shallbe removed from the place of trench and deposited at a place as directed by the YPS PATIALA representative.

**12.8 Cables laid in built up trench/ trays**

12.8.1 Before the commencement of cable laying the cable trench shall be drained properly. Cable shall be properly clamped to the cable supports which are provided in the cable trench / tray. The method of clamping shall suit the size of the cable and the cable supports which are provided in the cable trench. While removing the cable from the drum and also while pulling, all the care that are detailed above should be followed.

12.8.2 Care shall be taken while removing and replacing the trench cover slab. It is the responsibility of the contractor to make good any damages to trench covers, existing cables etc.

**12.9 Cable terminations and straight through joints**

12.9.1 All cable jointing / termination materials such as straight through joint kits, cable glands, cable lugs, insulation tapes etc. shall be of approved makes. Prior approvals of YPS PATIALA representative is to be obtained beforehand.

12.9.2 Cable terminations should be done using suitable double compression gland, crimping with copper lugs.

12.9.3 Cable glands for armoured cables shall include a suitable armor clamp for receiving and securely attaching the armoring of the cable in a manner such that no movement of the armor occurs when the assembly is subjected to tension forces.

12.9.4 The cable gland shall not impose on the armoring; cable bending radius shall not be less than 12 times the diameter of the cable. The clamping ring shall be solid and of adequate strength.

12.9.5 Provision shall be made for attachment of an external earthing bond between the metallic covering of the cable and the metallic structure of the apparatus to which the cable is attached.

**12.10 Testing**

12.10.1 Once cable is laid, following tests shall be conducted in the presence of YPS PATIALA representative, before energizing the cable:

- i) Insulation resistance test with 500V megger between the cores and all the cores to earth (Armor) and the results are to be recorded.
- ii) Sheathing continuity test.
- iii) Continuity and conductor resistance test.

Tests conducted shall be as per IS and National Electrical Code.

**13.0 EARTHING**

13.1 This specification is intended to cover the requirements of supply, installation, testing and commissioning.

- 13.2** The PV module structure components shall be electrically interconnected and shall be grounded. Earthing shall be done in accordance with IS 3043-1986, provided that earthing conductors shall have a minimum size of 6.0 mm<sup>2</sup> copper, 10 mm<sup>2</sup> aluminum or 70 mm<sup>2</sup> hot dip galvanized steel.
- 13.3** A minimum of two separate dedicated and interconnected earth electrodes must be used for the earthing of the solar PV system support structure and distribution boxes with a combined total earth resistance not exceeding 5 Ohm. The earth electrodes shall have a precast concrete enclosure with a removable lid for inspection and maintenance. The entire earthing system shall comprise non-corrosive components.
- 13.4** The system should be provided with adequate earthing points. This includes earthing for lighting, system grounding, separately for DC and AC active points. The frame of the PV module array should be earthed at multiple points.
- 13.5** To prevent the damage due to lightning, one terminal of the lightning protection arrangement by way of proper earthing is to be provided. The provision for lightning & surge protection of the SPV power source is separately earthed.
- 13.6** In case the SPV Array installed in the field separate earth has to be provided for SPV array and System at closer points of the array and the equipment respectively. It shall be ensured that all the earthing are bonded together to prevent the development of potential difference between any two earthing.
- 13.7** Earth resistance shall not be more than 5 ohms. It shall be ensured that all the earthing are bonded together to make them at the same potential.
- 13.8** The earthing conductor shall be rated for the maximum short circuit current. & shall be 1.56 times the short circuit current. The area of cross-section shall not be less than 1.6sq mm in any case.
- 13.9** The array structure of the PV module shall be grounded properly using adequate number of earthing pits. All metal casing / shielding of the plant shall be thoroughly grounded to ensure safety of the personal and power plant.
- 13.10** Automatic ground fault protection circuits to be installed to monitor any unwanted current flow to the ground and should active to prevent any damage.
- 13.11** The SPV Power Plant should be provided with lightning and over voltage protection. The principal aim in this protection is to reduce the over voltage to a tolerable value before it reaches the PV or other sub-systems components. The source of over voltage can be lightning or any other atmospheric disturbance. The Lightning Arrestor (LA) is to be made of 1 ¼" diameter (minimum) and 12 feet long GI spike on the basis of the necessary meteorological data of the location of the projects. Necessary foundation for holding the LA is to be arranged keeping in view the wind speed of the site and flexibility in maintenance in future. Latest grounding equipment should be used for this purpose. Each LA shall have to be earthed through suitable size earth bus with earth pits. The earthing pit shall have to be made as per IS 3043.

- 13.12** Electrode shall be made of GI pipe having a clean surface and not covered with paint, enamel or poorly conducting material. Galvanized pipe shall not be smaller than 38 mm ID. Earthing with pipe electrode shall be done as per the details indicated in IS : 3043/87 Electrodes shall be embedded below permanent moisture level.
- 13.13** The length of pipe electrodes shall not be less than 2.5m. If rock is encountered, pipes shall be driven to a length of not less than 2.5m with suitable inclination. Pipe shall be in one piece and deeply driven.
- 13.14** To reduce the depth of burial of an electrode without increasing the resistance, a number of rods or pipes may have to be connected together in parallel. The distance between two electrodes in such a case shall not be less than twice the length of the electrode. The earthing lead shall be connected by means of a through bolt, nuts and washers and cable socket.
- 13.15** Testing
- 13.15.1 The earth resistance of each electrode shall be measured by using a reliable and calibrated earth Megger and recorded. The values shall be as per IS/IE rules

#### **14.0 SOLAR PV MODULES MOUNTING STRUCTURE**

- 14.1** The PV modules shall be mounted on fixed metallic structures having adequate strength and appropriate design, which can withstand the load of the modules and high wind velocities. The support structure shall be hot dip galvanized steel or aluminum alloy or galvanized steel.
- 14.2** Detailed specifications for the mounting structure are given below:
- 14.3** Wind velocity withstanding capacity: 150 km / hour
- 14.4** Structure material: class-B hot dip galvanized steel with a minimum galvanization thickness of 120 microns or aluminum alloy.
- 14.5** Bolts, nuts, fasteners, and panel mounting clamps should be of galvanized steel and quality certified by CE and manufactured in ISO 9001 company
- 14.6** Anchoring arrangement for mounting structure of PV modules on the RCC- roofs shall be with removable concrete ballast, made of polymer modified concrete (PMC)/(LMC) or PCC (1:1.5:3)- M20, that holds the anchor bolts. An epoxy bonding layer is to be provided, in case M20 mix is used, between the parent concrete and the ballast after removing the waterproofing layer and thoroughly cleaning to expose a clean concrete surface.
- 14.7** The water proofing layer should be repaired / rebuilt to the original composition and texture wherever broken / disturbed during the installation process of the solar panels and their mounting structures. The ballast / pedestal holding the anchor bolts and the joint between it and the water proofing layer has to be covered with a suitable water proofing layer.

**14.8** Civil scope of work should be carried out as per YPS PATIALA staff direction and as per drawing enclosed.

### **15.0 Installation**

15.1 The structures shall be designed for simple mechanical on-site installation. There shall be no requirement of welding or complex machinery at the installation site. Minimum distance between roof edge and mounting structure shall be 0.6m. Access for panel cleaning and maintenance should be provided. All solar panels must be accessible from the top for cleaning and from the bottom for access to the module junction box.

15.2 Panels shall be installed in North – south orientation with a fixed tilt angle depending on the location co-ordinates of, Nano Center (Lat: 17.3045 & Long: 78.5065) and Sol-Gel (Lat: 17.3034 & Long: 78.5073) buildings at YPS PATIALA, south facing.

15.3 The prospective Installer shall specify installation details of the solar PV modules and the support structures with lay-out drawings, other technical details and array connection diagrams. The work shall be carried out as per the design provided by YPS PATIALA.

15.4 Installation & Commissioning and Safety: the installation of the PV arrays, Inverters and other components should be as per the IEC 61173, IEC 62548, IEC61140 and IEC 62109 – 1 & 2 standards.

### **16.0 General**

**16.1** All materials used for connecting the earth lead with electrode shall be of GI in case of GI pipe and GI plate electrodes, and of tinned brass in case of copper plate electrode. The earthing lead shall be securely connected at the other end to the main board.

**16.2** The earthing lead from electrode onwards shall be suitably protected against mechanical injury by routing the earth wire / strip through a suitable size of GI pipe wherever necessary.

**16.3** All medium voltage equipment shall be earthed by two separate and distinct connections with the earth. All materials, fittings etc. used in earthing shall conform to Indian standard specifications wherever they exist. In the case of materials for which Indian standard specifications do not exist, such materials shall be approved by the YPS PATIALA representative.

**16.4** The earth electrode shall be kept free from paint, enamel and grease. It shall be ensured that similar materials are used for respective earth electrodes and earth conductors. Earth electrode shall not be installed in proximity to a metal fence.

**16.5** Copper/GI strip shall be connected to the respective earth electrodes, either by brazing or welding respectively. The Copper/GI strip shall be jointed only either by brazing or by riveting at the end of overlapping portions. The overlap shall not be less than 50 mm.

**16.6** Earthing clamps used for supporting earth strips shall be made of such materials so as to avoid bimetallic action between strip and clamps.

**16.7** The installation, commissioning & trials to demonstrate proper functioning of the all the systems will be the responsibility of the supplier.

**16.8** The bidders have to supply the calibration reports for all sensors from the authorized calibration laboratory.

**17.0 TOOLS, TACKLES AND SPARES**

**17.1** The Installer shall keep ready stock of tools, tackles and essential spares that will be needed for the day-to-day maintenance of the solar PV system. This shall include but not be limited to, the following:

- I. Screw driver suitable for the junction boxes and combiner boxes.
- II. Screw driver and / or Allen key suitable for the connectors, power distribution blocks, Circuit breaker terminals and surge arrestor terminals.
- III. Spanners / box spanners suitable for the removal of solar PV modules from the solar PV module support structure.
- IV. Solar panel mounting clamps.
- V. Cleaning tools for the cleaning of the solar PV modules.
- VI. Spare fuses.

**18.0 DATA Monitoring:**

**18.1** Online monitoring to be ensured & provided the contractor. Extender and range will be provided by the owner.

**19.0 CAUTION SIGNS**

**19.1** In addition to the standard caution and danger boards or labels as per Indian Electricity Rules, the cable junction box near the solar grid-tie inverter, the building PCC board to which the AC output of the solar PV system is connected shall be provided with a non-corrosive caution label with the following text:

**19.2** The size of the caution label shall be minimum 105mm (width) x 20mm (height) with white letters on a red background.

## **20.0 DOCUMENTATION**

**20.1** The complete documentation should be as per IEC 62446 and submitted to YPS PATIALA

- One set of operation manuals complete with drawing, parts list (with part codes) circuit diagrams with list ratings of components and list of do's and don'ts for the main equipment as well as the sub-systems should be submitted to YPS PATIALA
- One set of maintenance manuals with full information on drawings, circuit diagrams, list and suppliers addresses for bought out parts, troubleshooting charts, programs of built in controllers etc. for the main equipments as well as for the sub-system.
- These manuals should be in the form of hard (printed) copy in English Language as well as in electronic storage form (disc pen drive etc.)

**20.2** A certificate for the adequacy of the manuals should be obtained and provided with the manuals. Such certificate must be signed by the QA engineer of the manufacturer

**20.3** The Installer shall supply the following documentation also:

- a) System description with working principles.
- b) System single line diagram.
- c) Solar PV array lay-out.
- d) Routing diagram of cables and wires.
- e) Data sheets and user manuals of the solar PV panels and the solar grid-tie inverter.
- f) A system operation and maintenance manual.
- g) Name, address, mobile number and email address of the service centre to be contacted in case of failure or complaint.
- h) Warranty cards.
- i) Maintenance Register.

## **21.0 TEST CERTIFICATES AND REPORTS TO BE FURNISHED**

**21.1** Test Certificates / Reports from IECQ / NABL accredited laboratory or MNRE approved test centers for relevant IEC / equivalent BIS standard for quoted components shall be furnished.

**21.2** Type Test Certificates shall be provided for the solar modules and the solar grid inverters to provide evidence of compliance with standards as specified in relevant articles of this Technical Specification.

**21.3** YPS PATIALA reserves the right to ask for additional test certificates or (random) tests to establish compliance with the specified standards.

## **22.0 AC Main junction box.**

**22.1** IP 65 construction

- 22.2** Design, GA drawing should be submitted for approval prior to fabrication.
- 22.3** Rittal make panel of 14 gauge should be used.
- 22.4** Incoming & Out going cables should be provided with required protection and metering i.e. I, V, Cos $\Phi$ , KVA, KW, KVAR along with CT's of metering class.
- 22.5** Mounted on angle 50x50x6mm GI angle frame with concrete foundation.
- 22.6** well ventilation with canopy construction.
- 22.7** Bottom plate should be 3mm and should able to provide space for 10runs of 3.5Cx185sqmm terminations i.e. 5runs in coming & outgoing cables.
- 22.8** Two earth pits for body earthing should be provided for two-point earthing
- 22.9** 3runs of 3.5cX185sqmm from 50KW & 40kw plant and 2runs of 3.5c X 185sqmm from 50 KW & 40 kw plant to Main junction box and 5runs of 3.5cX185sqmm from mainjunction box to Double bus bar panel in DG Room of aluminum armoured cable

**VOL – VI**  
**Technical Description of BOQ Items**  
*(Annexure I-Technical)*  
**&**  
**Approved Makes and Standards**

<b>APPROVED MAKES</b>	
1. SOLAR PANELS	BHEL/ TATA/Havells/Panasonic
2. GRID-TIE STRING INVERTERS	DELTA, FRONIOUS, PANASONIC, POLYCAB
3. POWER CABLES	UNISTAR / FINOLEX/ KEI, POLYCAB
4. CONTROL CABLES	UNISTAR / LAPP/ FINOLEX/POLYCAB
5. LT SWITCHGEAR	L&T / SIEMENS / SCHNEIDER
6. STEEL MEMBERS	TATA / VIZA .STEEL/SAIL/JYOTI (GI coating done)
7. EARTHING/ LIGHTNING ARRESTER	ERICO / GSI/ OBO BETTERMANN INDIA/ TRUE POWER

