

Tender No. : 21000033-HB-11109



Tender Published On : 22-Feb-2022 19:30

Hindustan Petroleum Corporation Limited
Corporate Identification Number L23201MH1952GOI008858

Basic Information Of Tender		
Title	S&I OF 30KW SOLAR@COCO KURGAON	
Description	Supply and Installation OF 30KW SOLAR at COCO KURGAON	
Tender Type	Limited	
Tender Scope	Domestic	
Bid Type	Two Bid	
Evaluation Criteria	Overall L1 for all items	
Tender Due Date & Time	07-Mar-2022 14:00	
Reverse Auction Applicable	No	
Pre Bid Conference Start Date & Time		
Pre Bid Conference End Date & Time		
Queries Start Date & Time	23-Feb-2022 10:00	
Queries End Date & Time	05-Mar-2022 15:00	
Un Priced Bid Open Date & Time	07-Mar-2022 14:30	
Purchase Deptt.	PURCHASE DEPT. - MUGHALSARAI RRO	
TF/EMD Drop Box Address	HPCL Office, second floor, North Square Building, Varanasi, UP	
Tender Description	This tender is floated for Supply and Installation of 30 KW capacity Hybrid Solar System at COCO KURGAON Scope of Job Complete installation of the system with civil work Module cleaning system CAMC for 5 years Terms and Conditions PENALTY CLAUSE APPLICABLE AS PER DELAY AS PER TERMS and CONDITIONS RETENTION MONEY 3 percent OF THE BILL VALUE WILL BE RETAINED FOR THE PERIOD OF ONE YEAR FROM THE DATE OF RECEIPT OF THE PAYMENT Payment Terms Payment shall be made by CPC NCZ 15 days from the receipt of the invoice Completion Period Within 30 days Job shall be awarded to a single party	
Notice Inviting Tender		
Currency Type	Tender Fee	EMD
INR	0	0

Delivery Terms - Free to Destination location unless specified otherwise. Validity of offer - 90 days from the initial or extended Due Date for submission of Tender whichever is later unless specified otherwise. Liquidated Damages/Price Reduction clause accepted unless specified otherwise.

In case bidder does not deviate from the standard offer validity in on line deviation form, bid's offer validity shall be considered as mentioned above.

In case a Revised priced bid is initiated for this tender, at a later date (eg Technical evaluation stage etc), it shall be incumbent upon the bidder to submit revised bids for the specified items/entire tender. In the absence of revised bids from the bidder within specified time period, the original bid submitted by the bidder shall not be considered for evaluation.

Organization reserves the right to reveal the contents of the bid documents submitted by the vendor during the witness bid opening process as per prevailing policy of the corporation.

Please quote all the taxes, if applicable, only in percentage terms and not in Per unit(Amount) basis. The Per unit option is provided only to quote for extras like Loading charges, packing charges, TPI charges etc. In case, it is found that you have quoted taxes in amount basis, your bid may be liable for rejection.



Line Details Of Tender							
Srl. No.	Line Description	Ship To Location	UOM	Quantity	HSN Code	Location GSTIN	Mandatory
CH1				Mandatory: Yes			
1	Supply of 30KW Solar System	11109-VARANASI RETAIL REGIONAL OFFIC	Each	1		09AAACH1 118B1ZA	Yes
DESCRIPTION => INSTALLATION, TESTING AND COMMISSIONING OF SOLAR SYSTEMS ABOVE 50 KWP AND UPTO 100 KWP ON BUILDING ROOF TOPS, CAR PARKING AREAS, STRUCTURES, BARREN LAND, ETC. SCOPE SHALL BE AS PER TECHNICAL SPECIFICATIONS.							
2	SOLAR PLANT -INST & COMMSNG	11109-VARANASI RETAIL REGIONAL OFFIC	Each	1		09AAACH1 118B1ZA	Yes
DESCRIPTION => ERECTION, INSTALLATION & COMMISSIONING OF AC ROOF TOP SOLAR PV PLANT AS PER THE TENDER TERMS AND CONDITIONS.							
3	CAMC Year-1	11109-VARANASI RETAIL REGIONAL OFFIC	Each	1		09AAACH1 118B1ZA	Yes
DESCRIPTION => CAMC OF SOLAR SYSTEM: COMPREHENSIVE MAINTENANCE FOR SOLAR SYSTEM.							
4	CAMC Year-2	11109-VARANASI RETAIL REGIONAL OFFIC	Each	1		09AAACH1 118B1ZA	Yes
DESCRIPTION => CAMC OF SOLAR SYSTEM: COMPREHENSIVE MAINTENANCE FOR SOLAR SYSTEM.							
5	CAMC Year-3	11109-VARANASI RETAIL REGIONAL OFFIC	Each	1		09AAACH1 118B1ZA	Yes
DESCRIPTION => CAMC OF SOLAR SYSTEM: COMPREHENSIVE MAINTENANCE FOR SOLAR SYSTEM.							
6	CAMC Year-4	11109-VARANASI RETAIL REGIONAL OFFIC	Each	1		09AAACH1 118B1ZA	Yes
DESCRIPTION => CAMC OF SOLAR SYSTEM: COMPREHENSIVE MAINTENANCE FOR SOLAR SYSTEM.							
7	CAMC Year-5	11109-VARANASI RETAIL REGIONAL OFFIC	Each	1		09AAACH1 118B1ZA	Yes
DESCRIPTION => CAMC OF SOLAR SYSTEM: COMPREHENSIVE MAINTENANCE FOR SOLAR SYSTEM.							

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TENDER HEADER

Sl.No.	Description	Attached File	Set Value	Supporting Doc. Req'd
1	TENDER HEADER	Tender Document.pdf	-	No

INSTRUCTIONS TO BIDDERS

e-TENDER

This is an e tender and completed tenders in all respect should be submitted on-line at website <https://etender.hpcl.co.in> by the tender due date / time. Bids shall be opened online. No manual submission of tenders shall be permitted. As this is e-tender bidders may witness the opening of tender at all stages of tender processing, by remote log in into the above portal at the comfort of their offices.

For technical and commercial queries, please contact:

Mr Shailesh Singh

Senior Manager – Retail Engg

Varanasi RO

E-mail: shaileshksingh@hpcl.in

7408770888

This tender is floated for Supply & Installation of 30 KW capacity Solar System (Hybrid system) on the rooftop of COCO KURGAON.

To reduce the carbon foot prints including putting up of solarisation at the Outlet.

Our own solar facility which makes commercial sense on account of expected savings in the cost of electricity in addition to supporting sustainability.

EARNEST MONEY DEPOSIT (EMD) : NIL

EMD will not be applicable for this tender. However, you are required to submit the duly signed and sealed **“Bid Security Declaration”** on your letter head along with your offer.

Bid Security Declaration format is attached.

Kindly note that wherever Retention Money has been referred in the tender, it will be calculated at **3% instead of 10%**.

Completed tenders in all respect should be submitted on-line at website <https://etender.hpcl.co.in> by the tender due date / time. Unpriced (Technical) bids shall be opened on-line

Existing HPCL Vendors :

Please log in at site (<https://etender.hpcl.co.in>) and respond to the tender. Please note that this is an on line tender and on line response submitted at site(<https://etender.hpcl.co.in>) shall only be accepted. For submitting on line response Digital Certificate / Signatures (Class III) shall be mandatory. In case, you are logging in for the first time please ensure to upload your Digital certificate. The process for same is listed in the Help link after logging in.

PLEASE LOGIN WITH YOUR EIGHT DIGIT JDE VENDOR CODE AS GIVEN IN THE SUBJECT ABOVE AND CORRESPONDING BILL TRACKING SYSTEM (BTS) PASSWORD TO BID FOR THE TENDER. In case of any difficulty in logging or in case you do not have the BTS password, please send mail to eprochehelpdesk@mail.hpcl.co.in OR please call us at **022-41146666**. The helpdesk support is available 6 days a week from **8AM to 8 PM** (except public holidays). Pls refer to help link after logging in, in case you are new to e-Tender.

Check list for Bidders:

1. Following documents are to be uploaded as a part of Pre-qualification of Bid:

- Supporting documents towards bidder's qualification criteria (work orders, completion certificates, and turnover statements; duly notarized)

2. FOLLOWING DOCUMENTS ARE TO BE UPLOADED AS A PART OF TECHNICAL BID:

- Duly filled Declaration for non-black listing
- Duly filled Bid Security Declaration
- Duly filled, Deviation template provided in the portal. If there are no deviations, then nil deviation radio button shall be selected. *Deviations mentioned by the bidders anywhere else in the tender other than in Deviation Template provided in the e-tender portal, shall not be considered. No further correspondence on this shall be entertained at any stage.*
- Agreed terms and conditions sheet.
- Various statutory docs like GST Registration certificate for Indian Bidders.
- Additional Data as sought in the tender documents.

Unpriced bid containing rates shall make the bid liable for rejection.

The Bid and all supporting documents submitted and all correspondence whatsoever exchanged by Vendor and HPCL shall be in English language only.

Price Bid (Online) shall contain only the rates. Price bid shall not contain any data, conditions etc. other than the rate. Any conditions, data given in priced bid will be ignored and not considered.

Quoted rate shall be inclusive of all components viz. packing charges, loading unloading charges, insurance, Third party Inspection Charges, transportation to site etc. if any.

Bidder should quote applicable rate of GST as per GOI notification against each line item in the space provided in online bid.

PO Distribution: 100% Job to L1 Bidder.

FIRM RATES:

The rates shall remain unchanged till the expiry of Contract and no Revision of Rates shall be entertained from parties for any reason. No Escalation / De-escalation of rates are applicable.

VALIDITY OF OFFER:

The offer shall be valid for a period of 120 days from the due date/ extended due date of opening of the un-priced bid. Corporation reserves the right to take action as deemed fit, including putting the bidder under suspension / holiday, in case of withdrawal of Offer at any stage, non-acceptance of LOA/LOI/PO or any other breach of Tender terms and conditions.

PLANNING AND DESIGNING IN PURVIEW OF VULNERABILITY ATLAS OF INDIA

Vulnerability Atlas of India (VAI) is a comprehensive document which provides existing hazard scenario for the entire country and presents the digitized State/UT - wise hazard, maps with respect to earthquakes, winds and floods for district-wise identification of vulnerable areas. It also includes additional digitized maps for thunderstorms, cyclones and landslides. The main purpose of this Atlas is its use for disaster preparedness and mitigation at policy planning and project formulation stage.

This Atlas is one of its kind single point source for the various stakeholders including policy makers, administrators, municipal commissioners, urban managers, engineers, architects, planners, public etc. to ascertain proneness of any city/location/site to multi-hazard which includes earthquakes, winds, floods thunderstorms, cyclones and landslides. While project formulation, approvals and implementation of various urban housing, buildings and infrastructures schemes, this Atlas provides necessary information for risk analysis and hazard assessment.

The Vulnerability Atlas of India has been prepared by Building Materials and Technology Promotion Council under Ministry of Housing and Urban Affairs, Government of India and available at their website www.bmtpc.org.

It is mandatory for the bidders to refer Vulnerability Atlas of India for multi-hazard risk assessment and include the relevant hazard proneness specific to project location while planning and designing the project in terms of:

- i. Seismic zone (II to V) for earthquakes
- ii. Wind velocity (Basic Wind Velocity: 55, 50, 47, 44, 39 & 33 m/s)
- iii. Area liable to floods and Probable max. surge height
- iv. Thunderstorms history
- v. Number of cyclonic storms / severe cyclonic storms and max sustained wind specific to coastal region
- vi. Landslides incidences with Annual rainfall normal
- vii. District wise Probable Max. Precipitation

PAYMENT TERMS

Vendors have been facilitated to submit digitally signed invoices through the Vendor Bill Tracking System (BTS) Portal effective 01.10.2020. Pls. refer the user manual outlining the process hosted on BTS portal for further details.

Payments will be made against bills certified by the HPCL Engineer-in-Charge/Site-in-Charge within 15 days from the date of receipt of the bill and all other related documents in line with the timelines mentioned in this Tender Document.

Technical Bid containing rates shall make the bid liable for rejection for all bidders.

HPCL reserves the right to solicit documents/additional documents to verify the eligibility of bidders for Bids qualification during any stage after opening of technical bid. HPCL also reserves the right to seek clarification on taxes (GST) quoted by the bidders and to correct/load appropriate tax rates as required and evaluate bids accordingly.

PRE QUALIFICATION CRITERIA

1.0 BRIEF SCOPE OF WORK:

Design, Engineering, procurement & supply, erection, commissioning of battery based Solar PV Power System (Hybrid system) at COCO KURGAON, along with Comprehensive Operation & Maintenance for 5 (Five) Years including supplying of spares and consumables from the Commissioning date (CoD).

Bidders are required to qualify each of the following Pre Qualification Criteria to become eligible for further evaluation. HPCL reserves the right to independently verify with their client to assess bidder's capability against any of the following criteria.

2.1 TECHNICAL CRITERIA:

Applicants shall have experience of having successfully carried out & completed similar work in India during the last seven years ending July - 2020 which experience should be any one of the Following:

1. Six similar completed works each of Capacity not less than 6 Lacs.
OR
2. Two similar completed works each of Capacity not less than 10 Lacs.
OR
3. One similar completed work of capacity not less than 15 Lacs.

The solar power plant should have been installed with below technical specification as mentioned in the tender. The contractor should submit Manufacture authorization from Inverter manufacture and Module manufacturer. The installer should be a certified / trained installer partner for the manufacturer.

Definition of similar work:

Bidder should have prior experience of having set up and put into operation (thru Single Contract and at One Location Premises) of a roof top/Ground mounted solar power plant including Supply, Installation, Erection, Testing & Commissioning of Ground Mounted/ Rooftop Solar Plant under Net Metering Policy. The bidder should have also handled the Liaison work with State Discom agencies for Net Metering Connection.

The Bidder shall furnish following documentary evidences along with the bid for meeting the Bid

Qualification Criteria:

1. Copy of Purchase order specifying the completed Scope of work and work completion certificate from Client clearing mentioning the date of Commissioning of plant.

2.2. Financial Criteria

Average Annual Financial Turn over during the last three years ending 31st March 2021 should be at least Rupees 50 Lacs.

Average turnover shall be determined by summing up the annual turnover of each financial year and dividing the sum by three. In the event a bidder does not have any turnover in any one or two of the years of the stated Financial years, the turnover for that/those years shall be taken as zero and the average turnover shall be calculated to determine the conformity to the turnover criteria.

In case where the audited result for the last financial year, i.e., 31st March 2021 as on date of submission of the tender is not available, the audited results of three consecutive financial years preceding the last financial year shall be considered for evaluation the financial parameters subject to submission of a certificate signed by CEO/CFO/Partner/Proprietor of the bidder stating that the financial results of the last financial year of the company/Firm are under audit as on the due date of submission of the bid.

Bidders shall meet both the above criteria i.e. Technical and Financial to be eligible for this tender. Offers of bidders not meeting Bid Qualification Criteria Technical or Financial shall be rejected.

Technical Specification of Solar PV Plant:

1. SOLAR PHOTOVOLTAIC MODULES

- a. The solar photovoltaic modules to be used for the project should be of Poly Crystalline technology or mono crystalline technology.
- b. The Solar PV Module should contain high power silicon cells. The Solar cells shall have surface anti-reflective coating to help absorb more light in all weather conditions.
- c. The rated capacity of the Solar Modules should be equal to or greater than 400Wp for COCO Kurgaon Solar Modules to be used must be framed only.
- d. Solar Module should be laminated using established polymer (EVA) and Pedlar / Polyester laminate.
- e. The solar modules shall have suitable encapsulation and sealing arrangements to protect the Silicon cells from the environment.
- f. Module should be PID Free and of positive Tolerance only.
- g. SPV modules should be designed and manufactured to meet the recognized standard, which must have been used extensively with an excellent track record of performance. Higher efficiency Solar PV Modules shall be preferred. Bidders should submit the technical literature with detailed technical specifications of the modules well as the drawings & manuals.
- h. The SPV Module should be tested and should have IEC test certificate from any recognized IEC accredited test centres. The Test certificates can be from any NABL/

BIS accredited Testing / calibration laboratories. The test certificates should have validity of at least 6 months from the date of submission of the tender document.

j. The SPV modules should confirm to the minimum technical specification laid down by MNRE.

k. SPV Modules shall be certified as per IEC 61215, IEC 61730 and IEC 61701 amended up to date or equivalent standards.

l. The PV Modules shall be tested for Salt Mist Corrosion Test as per MNRE requirement.

m. The Solar Modules offered shall have a Power warranty of 25 years. Solar PV modules must be warranted for their output peak watt capacity, which should not be less than 90% of the name plate rated capacity at the end of 10 years and not less than 80% of the rated name plate capacity at the end of 25 years. All specifications refer to the Standard Test Conditions (STC).

n. The I-V curve of each PV Module with Serial Numbers must be submitted along with the Handover documents.

o. The Solar PV Modules should also be warrantied against manufacturing defects and workmanship for 10 years.

p. Identification and Traceability: Each Solar PV module must have a RF Identification tag. The following information must be mentioned in the RFID used on each of the Solar Module. This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions:

- Name of Manufacturer of Solar PV Module
- Name of the Manufacturer of Solar Cells
- Month and year of the manufacturer (Separately for Cell and module)
- I-V Curve for the module
- Country of Origin (Separately for Cell and module)
- Wattage , I_m , V_m , and Fill factor for the module
- Unique Serial no and Model No of the Module.
- Date and year of obtaining IEC PV module qualification certificate.
- Name of the test laboratory issuing IEC Certificate
- Other relevant information on traceability of Solar Cell and module as per ISO 9000
- series

q. The modules must also confirm to the standards mentioned by the concerned State Nodal Agency.

The approved makes for Solar Modules are: CEL, Waaree, Vikram, Emmvee, PV Tech Solar, Adani

2. TECHNICAL SPECIFICATION FOR INVERTERS

The Inverter/s used should be robust, intelligent string inverters manufactured by reputed international companies having sales and service office in India. The inverter/s must conform to the IEC 61683 and IEC 60068-2, IEC 62116, IEC 61727. The typical specifications required are as under:

a. The inverters should be string inverters only with IP65 or IP67 rating for outdoor applications with rated AC Output capacities from 25kW to 75 kW.

b. All inverters should be 3 phase, 415V, 50Hz AC output with LED/LCD display.

c. Minimum Start Voltage should be between 200V to 400 V

d. MPPT Range 350V-800V

e. Maximum Input Voltage: 1000V DC

f. Euro / CEC Efficiency above 97%

g. Frequency: 50Hz +/- 1.5%

h. Power Factor > 0.99

i. THD < 3%

j. Ambient Temperature range: -20°C to + 60°C

- k. Warranty: 5 Years Comprehensive extended upto 20 years.
- l. Integrated Ground Fault Protection
- m. In built DC Surge protection or external in Array Junction Box.
- n. Anti Islanding Feature
- o. Transformerless
- p. Over Voltage/ Under Voltage Protection
- q. Auto Shut down in case or Over Heat/ Over Temperature.
- r. The inverter/s should be equipped with an inbuilt web based data logger or should be compatible with an external datalogger along with appropriate softwares log data and to generate reports/ graphs for AC generation in kWh, Peak daily KW, monthly generation in kWh, annual generation in kWh and other features.

Approved Makes of the inverter are: SMA, Kaco, ABB, Schnieder, Fronius, K -Star , Delta, Solar Edge, Sungrow

3. TECHNICAL SPECIFICATION FOR SOLAR MODULE MOUNTING STRUCTURE

- a. Supply of complete solar module mounting structure, hardware etc. shall be suitable for ground mounting as per site requirements along with installation shall be in the scope of selected Bidder. Module mounting structure should be as per MNRE specifications.
- b. The structure shall be designed in accordance with the latitude of the place of installation. The array mounting structure shall be designed to allow easy replacement of any module and shall be in line with site requirement. Structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly. Site visit by bidder is recommended for the same.
- c. The steel structures shall be fabricated of structural steel as per latest BIS 2062 (amended up to date) galvanised in compliance of BIS 4759 (amended up to date)
- d. The support structure is to be Hot Dipped Galvanized steel made from ISI marked M.S angles/channels or Pre Galvanized extruded sections. The minimum thickness of galvanization for MS or MS extruded sections should be of 70 microns. All fixing fasteners and nuts and bolts should be of SS 304 only.
- e. The array structure shall be so designed to occupy minimum space without compromising the output from the Solar PV System.
- f. The minimum clearance of the lowest part of the module and the ground level shall not be less than 500 mm. However, if the water table in the given location of the Solar PV Plant is higher, the selected bidder is advised to raise the structure height suitably so that the at no instance in event of water logging, the solar PV Modules are submersed in water.
- g. The structures are to be pre-fabricated for easy assembly at site. No hot work will be allowed at site.
- h. The foundation design should be made by the structural engineer giving due consideration to the weight of the module, the weight of the structure assembly, maximum wind speed of the area, soil condition, seismic factors of the site, as all structural/ Civil considerations for ensuring the safety and durability of the Structure.
- i. The structure along with the foundation blocks are to be designed to withstand wind speed up to 180 Km/hr.

- j. The design of the structure and foundation should meet IS 800- 2007 Standards. The design calculations, STADD calculations and the wind speed analysis for the foundations & solar mounting structure shall be signed and sealed by the RCC Structural consultant of the supplier and submitted before the despatching the Solar Module mounting structure to site.
- k. The selected bidders structural engineer will also certify the installation of the Solar PV Module mounting structure after the installation work is complete. The same must be submitted to HPCL along with the project handing over documents.
- l. The foundation pedestals where-ever necessary shall be concrete.
- m. The installation, testing & commissioning of SPV structures shall be in Bidders scope. Any civil/mechanical job for the same shall be done by Bidder. All materials related to mounting of SPV shall be on the Bidders Scope.

4. TECHNICAL SPECIFICATION – CABLES & ELECTRICAL CONTROLS

- a. All the necessary Solar DC cables / wires shall be supplied shall be of stranded Copper conductor only according to IEC 60228, with XLPO insulation, UV resistant and resistant against water, oil & salt, Halogen free, Low smoke emission and flame retardant features. Positive and Negative Solar DC cables and wires have be be routed through suitable separate flexible PVC pipes/ Cable trays etc. Solar DC cable / wire maximum temperature rating should be +120 °C. The solar DC cables should be carry TUV certification.
- b. AC cables from Inverter to Inverter Interactive Panel should be 1.1kV grade, 4C stranded copper conductor, of suitable rating as per requirement.
- c. 4/ 3.5 core XLPE Copper / Aluminium Armored cable of suitable thickness is to be used from Inverter Interaction Panel to the Main L.T Panel conformig to IS:1554/IEC :227.
- d. All connections should be properly made through suitable lug/terminal crimped with use of suitable proper cable glands.
- e. The size of cables/wires should be designed considering the line loses, maximum load on line, keeping voltage drop within permissible limit and other related factors. Maximum permissible line losses should be less than 3%.
- f. The cables and wires should be ISI marked and confirm to latest BIS standards as required by MNRE for Solar applications. The ambient temperature range of the cables and wires to be used should be from -5° C to + 90° C and above only.
- g. All flexible cables to be properly dressed and enclosed suitable in UPVC Pipes and / or G.I Cable trays with covers.
- h. Suitable ferrules are to be used to number the cables for easy traceability. The cables are to be terminated in the equipment with copper lugs properly crimped.
- i. Flexible pipes and conduits are to be suitably used at corners and at places where there is a possibility of the cables getting cut by abrasion.
- j. All cables shall be of low smoke FRLS type & shall be routed through sand filled trenches between Inverters upto the Main LT Panel and existing LT Panels.

Solar DC Cables approved Makes: Polycab, Top Cable Spain, Lapp Germany, Siechem, Apar

AC cables: Finolex, Polycab, Havell' s, Lapp

5. LIGHTNING, SURGE & OVER VOLTAGE PROTECTION

- a. The SPV power plants shall be provided with lightning & over voltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc.
- b. Suitable equipments for AC and DC Surge Protection should be provided with the system.

- c. The area of the Solar PV Yard/ Array shall be suitable protected against lightning by deploying required number of Lightning Arrestors. Lightning arrestors should be as per IEC 62305. The protection against induced high-voltages shall be provided by use of metal oxide varistors (MOV's) and suitable earthing so that induced transients find an alternate route to earth.
- d. The lightning Masts/ Conductors shall be made as per applicable Indian Standards/ International standards to ensure complete protection of the Solar PV Yard and equipments /components therein.
- e. Necessary concrete foundation for securely holding the lightning conductor in position taking into consideration the wind speed in the area. Necessary guy wires should be given to ensure that the lightning conductor remains in position in event of heavy winds.
- f. Each Lightning Arrestor must be connect to 2 separate earth pits through suitable size copper cables/wire. The same should be confirm to necessary IS standards.
- g. Streamer type lightning protection system along with a counter may also be provided and the relevant IS code will be applicable for its installation.,
- h. The supply of lightning protection systems should also be in accordance to the HPCL standards.

6. EARTHING PROTECTION

- a. The earthing system shall be in strict accordance with IS: 3043 and electricity rules/Acts.
- b. The earthing system network / earth mat shall be of interconnected mesh of GI Flats buried in the ground in the plant. Suitable size of GI Flats to be used for the interconnection. The earth conductors shall be free from pitting, laminations, rust, scale and other electrical mechanical defects.
- c. Metallic frames of all electrical equipment shall be earthed by 2 separate and distinct connections to the earthing system, each of 100% capacity.
- d. Metallic sheaths/ screens and armour of multicore cable shall be earthed at both ends.
- e. Neutral connections and metallic conduits / pipes shall not be used for equipment earthing.
- f. Connections between earth leads and equipment shall be normally of bolted type.
- g. Back filling material to be placed over buried conductors shall be free from stones and harmful mixtures. Back filling shall be placed in layers of 150mm.
- h. Minimum spacing between electrodes shall be 2000mm.
- i. Necessary test point provision shall be made for bolted isolated joints of each earthing pit for necessary periodic checking of earth resistance.
- j. In compliance to Rule 33 and 61 of Indian Electricity Rules , 1956 (as amended to date), all non current carrying metal parts shall be earthed with two separate and distinct earth continuity conductors to an efficient earth electrode.
- k. The Solar structure, inverter, lightning arrester should have the separate earth pits. The number of earthpits is to be decided by the Bidder as per the requirements of the electrical inspector /CEIG or any concerned statutory body for the region.
- l. The earthing pit shall have to be made as per IS: 3043. All the array structures, equipments & control systems should be compulsorily connected to the earth. The earthing arrangement should also be approved by the electrical insector.
- m. The approved drawings from electrical inspector/ CEIG must be submitted to HPCL on completion of the project.
- n. Total plant earthing system shall be designed to give an earth resistance of less than 1 ohm all along with earth mesh.

7. TECHNICAL SPECIFICATION OF ARRAY JUNCTION BOX

- a. The array junction box should be dust, vermin & water proof as per IP65 rating and should be made of FRP/ABS plastic (Test certification is required for IP65 degree of protection).