BHAKRA BEAS MANAGEMENT BOARD

NIT

SPECIFICATION NO. 642 BBMB/P&D (TS) Dt. 08.02.2023

DESIGN, ENGINEERING, PROCUREMENT & SUPPLY, CONSTRUCTION & ERECTION, TESTING, COMMISSIONING, MANDATORY SPARES AND ASSOCIATED TRANSMISSION SYSTEM FOR GRID CONNECTED GROUND MOUNTED SOLAR PHOTOVOLTAIC PROJECTS OF CUMULATIVE CAPACITY MINIMUM 11.5MW (AC) OR HIGHER AS QUOTED BY THE BIDDER AT TWO DIFFERENT LOCATIONS OF BBMB (MINIMUM 10MW (AC) OR HIGHER CAPACITY AT 400KV SUBSTATION, BBMB BHIWANI AND MINIMUM 1.5MW (AC) OR HIGHER CAPACITY AT 220KV SUBSTATION, BBMB HISAR) ON LUMPSUM TURNKEY (LSTK) ALONGWITH ANNUAL MAINTENANCE FOR FIVE (5) YEARS EXTENDABLE FOR ANOTHER FIVE (5) YEARS.

(DOMESTIC COMPETETIVE BIDDING)

ISSUED BY:-

CHIEF ENGINEER/ TRANSMISSION SYSTEM
PLANNING & DESIGN (TS) DIRECTORATE
SLDC COMPLEX, INDUSTRIAL AREA PHASE - 1
B.B.M.B. CHANDIGARH.
TELEPHONE No. 0172- 2654468
PBX No. 0172- 2653735
Email: dirpp@bbmb.nic.in

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DISCLAIMER

1. Though adequate care has been taken while preparing the tender document, the bidder(s) shall satisfy themselves that the document is complete in all respect. Intimation regarding any discrepancy shall be intimated to BBMB immediately. If no intimation is received from any bidder within 10 (Ten) days from the date of issuance of Tender documents, it shall be considered that the document is complete in all respect and has been received/ acknowledged by the bidder(s).

2. BBMB reserves the right to modify, amend or supplement this document.

3. While this tender document has been prepared in good faith, neither BBMB nor their employees make any representation or warranty, express or implied, or accept any responsibility or liability, whatsoever, in respect of any statements or omissions herein, or the accuracy, completeness or reliability of information, and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of this document, even if any loss or damage is caused by any act or omission on their part.

Place: Chandigarh Date:

SECTION - I

INVITATION FOR BIDS (IFB)

(DOMESTIC COMPETITIVE BIDDING)

(SINGLE STAGE TWO ENVELOPE BIDDING FOLLOWED BY E-REVERSE AUCTION) UNDER E-TENDERING

INVITATION FOR BIDS (IFB)

FOR

Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning, Mandatory Spares and associated Transmission System for Grid connected Ground mounted Solar Photovoltaic Projects of cumulative capacity minimum 11.5MW (AC) or higher as quoted by the bidder at two different locations of BBMB (minimum 10MW (AC) or higher capacity at 400kV substation, BBMB Bhiwani and minimum 1.5MW (AC) or higher capacity at 220kV substation, BBMB Hisar) on Lumpsum Turnkey (LSTK) alongwith Annual Maintenance for five (5) years extendable for another five (5) years.

Cumulative Project Capacity of minimum 11.5 MW (AC) or higher as quoted by the bidder is divided into two different sites as per below table:

Sr. NO.	SITE DETAILS	SITE CAPACITY
1.	400kV Grid Substation, BBMB, Prem Nagar, BBMB colony, Hansi Road, Bhiwani, Haryana PIN-127031	**minimum** 10MW (AC) or higher capacity quoted by the bidder
2.	220kV Grid Substation, Near Jindal overbridge opposite Orion Hundai Satrod Khas, Hisar, Haryana PIN-125044	**minimum** 1.5MW (AC) or higher capacity quoted by the bidder

Eligibility conditions set forth in the tender document are as per minimum 11.5 MW (AC) cumulative capacity basis only. Bidders are required to quote accordingly for the complete cumulative capacity of minimum 11.5 MW (AC) on Lumpsum Turnkey (LSTK). However, bidders can quote cumulative capacity higher than 11.5MW (AC), based upon site survey by them prior to bid submission (minimum 10MW (AC) or higher capacity at 400kV substation, BBMB Bhiwani and minimum 1.5MW (AC) or higher capacity at 220kV substation, BBMB Hisar).

Evaluation of bid shall be carried out by per MW (AC) Price basis {Per MW (AC) Price shall be calculated by Grand Total Price of EPC (supply, mandatory spares and

service) and AMC divided by quoted cumulative capacity by bidder, but minimum 11.5 MW (AC)}. E-RA shall be carried out on per MW (AC) price. The total capacity of minimum 11.5 MW (AC) or higher as quoted by bidder shall be awarded to a single successful bidder (L1) selected after E-RA on Lumpsum Turnkey (LSTK) basis for the capacity quoted by the bidder.

However, there will be separate LOA/contract agreements for Two different sites with the single successful bidder. Based on the per MW (AC) Price of L-1 bidder after e-RA, the site wise EPC and AMC Price will be calculated by multiplying the per MW (AC) Price with the respective site capacity quoted by bidder. Accordingly, 2 (Two) different EPC and AMC, Letter of Award (LOA) /Contract Agreement will be released for the respective site by the Purchaser to the single successful bidder only.

EMD will be submitted by the bidders jointly for the cumulative capacity quoted by bidder but minimum 11.5 MW (AC). However, the successful bidder will be required to submit separate Contract Performance Security for EPC and AMC for respective solar sites i.e. at Bhiwani and Hisar.

REGARDING PPP

w.r.t. Ministry of New & Renewable Energy (MNRE) order no 283/22/2019-Grid Solar dated 23rd Sep. 2020 for the Public Procurement (Preference to make in India) including any amendments, to provide for Purchase Preference (linked with local content) in respect of Renewable Energy (RE) Sector & Department for Promotion of Industry and Internal Trade (DPIIT) Notification no. P-45021/2/2017- PP (BE-LI) dated 4th June, 2020 including any amendments,

The Procurement of Solar Modules & Solar Inverters for the subject tender will be done from Class-I Local suppliers only, wherein, a Class-I Local Supplier' means a supplier or service provider, whose Goods, Services or Works offered for Procurement, has Local Content equal to or more than 50%, as defined under the above said orders.

REGARDING ALMM

The provisions as contained in the O.M. dated 10.03.2021 issued by MNRE on the subject “Approved Models and Manufacturers of Solar Photovoltaic Modules (requirement of compulsory registration) order, 2019-Implementation-reg.” And its

subsequent amendments and clarifications shall be applicable for this tender. The Cells and Modules used in the project under this tender shall be sourced only from the Models and Manufacturers included in the list-I (solar PV modules) of ALMM order, Annexure-I of the OM, issued by MNRE on 10th march, 2021 which will be updated by MNRE from time to time. The modules to be procured for this project shall be from the list-I of the ALMM order applicable on the date of invoicing of such modules. Bidders shall also provide a disclosure regarding that they are aware of binding provisions of the ALMM order and the list(s) there under, while quoting for the tender.

REGARDING BCD

Ministry of New & Renewable Energy vide OM no 283/3/2018-Grid Solar dated 09.03.2021 has notified the imposition of Basic Customs Duty (BCD) on solar PV modules & cells with effect from 01.04.2022. Post this date solar modules will attract BCD @ 40% & solar cells will attract BCD @ 25%. Bidders are required to take note of this trajectory & bid accordingly, as the imposition of BCD as per this mentioned trajectory will not be considered under change in law.

(SINGLE STAGE TWO ENVELOPE BIDDING)

Under e-Tendering

1. PROFILE OF BBMB

Originally the Bhakra-Nangal and Beas Projects were the joint ventures of states of Punjab and Rajasthan. After re-organization of Punjab, Bhakra Management Board (BMB) was constituted under Section-79 of the Punjab Re-organization Act, 1966 w.e.f. 1st October 1967 for administration, Operation & Maintenance of Bhakra-Nangal Project. As per Section-80 of the Punjab Re-organization Act, the works of Beas Projects entrusted to Beas Construction Board (BCB) were subsequently transferred to Bhakra Management Board on completion and Bhakra Management Board was renamed as Bhakra Beas Management Board on 15th May, 1976 and is known as BBMB.

Thus, BBMB is a statutory body constituted under Punjab Reorganization Act, 1966 for managing Bhakra-Nangal & Beas Projects.

The BBMB is engaged in regulation of the supply of Water & Power from Bhakra Nangal and Beas Projects to the States of Punjab, Haryana, Rajasthan, Himachal Pradesh and Chandigarh. At present total installed capacity of BBMB Hydro projects is 2936.73 MW. All power generated from BBMB projects is apportioned amongst the partner States viz- Punjab, Haryana, Rajasthan, HP & UT Chandigarh in agreed ratio.

2. PROCEDURE/REQUIREMENTS FOR E-TENDERING

2.1 Offers/tenders should be submitted online before the stipulated time and on the last date prescribed for their receipt on https://eproc.punjab.gov.in. Online submission of offers/tenders is not possible after due Date/Time of posting of tender. Bidders who wish to participate in online tenders will have to register with the service Provider's website. Bidder will create login ID and password on their own in registration process.

2.2 Any queries can be clarified through email-cppp-nic@nic.in or via phone on Toll free no.1800-3070-2232 (24X7 Help-desk).

2.3 Bidders who wish to participate in this tender need to procure Digital Signature Certificate (with signing & encryption) as per Information Technology Act 2000 using that they can digitally signed their electronic bids. Bidders can procure the same from any or the CCA approved certifying agencies, or they may contact

service provider.

2.4 All the bidders are requested to get themselves registered well in advance and no extra time will be considered for the delay in on-line Vendor Registration, if any. In case bidder waits till the last moment for uploading bids, and if any technical problem is encountered at that time and the bid closing time may elapses, BBMB shall not be responsible in any manner for such delay/ or any other reason thereof.

2.5 Offers/ tenders will be opened on the date and time prescribed in the NIT/ Enquiry in the presence of authorized representative of tenderer, who actually submitted the tenders if they present themselves at the time of opening of tender. In case the date of opening of tenders falls on a holiday or holiday is subsequently declared on that date the tenders will be opened on the next working day following the holiday. Corrigendum for extending dates due to this (i.e. holiday/declaration of holiday) shall have to be issued on the e-procurement site by any officer who posted the NIT/ specification and this shall not require any approval.

2.6 The plant / equipment offered should be strictly according to the specifications laid down in the enquiry. The quotations should also indicate the name of the manufacturer, brand and company and accompanied with other descriptive literature and sample, if any.

2.7 As per the new Inter-operability guidelines released by Controller of Certifying Authorities (CCA), the Secured Socket Layer (SSL) certificate for a e-procurement application is generated on a new algorithm, SHA2. Also, the Digital Certificates that will be applicable for these platforms have to be SHA2 algorithm complaint. For the same, the users have to ensure that they have Windows7 or latest installed in their respective PC/Laptop, if applicable.

2.8 Cost of Digital Signature Certificate (with signing & encryption) and Registration with service provider, if any, shall be in bidder scope.

3. DETAILED SCOPE OF WORK INCLUDES

Design, engineering, procurement & supply, construction & erection, Testing, commissioning, mandatory spares and associated transmission system, multi-level inspections, packing and forwarding, receipt, unloading and storage at site, associated civil works, services, permits, licenses, including statutory approvals

(as applicable), installation and incidentals, insurance at all stages, Training etc. of cumulative capacity of minimum 11.5 MW (AC) or higher as quoted by bidder at two different locations of BBMB {minimum 10MW (AC) or higher capacity at 400kV substation, BBMB Bhiwani and minimum 1.5MW (AC) or higher capacity at 220kV substation, BBMB Hisar} Grid Interactive Solar PV Power Plant and Performance demonstration with associated equipment and materials, handing over of the project to BBMB etc. on Lumpsum Turnkey (LSTK).

Comprehensive Annual Maintenance of the Solar PV Power Plant for Five (5) years extendable for another Five (5) years as mentioned in detailed scope of work after successful commissioning and performance demonstration i.e. after Operational Acceptance, as detailed in technical specification including supply and storage of all mandatory spare parts, consumables, repairs/ replacement of any defective equipment etc.

The above scope of work is indicative and the detailed scope of work is given in the Scope of Work and Technical Specification (Section - VII) of the Tender Documents.

4. EMD shall be submitted online on e-portal as well as offline in a sealed envelope to the office of BBMB whose mailing address is mentioned in the Bid Information Sheet attached under Section - I (Invitation for Bids, IFB).

5. Performance Bank Guarantee (PBG) shall be furnished by the successful bidder after issuance of Letter of Award (LOA) by purchaser as detailed in bidding documents.

6. The detailed Qualifying Requirements (QR) are given in the Annexure to BDS.

7. BBMB shall conduct e-Reverse Auction (e-RA) as per provisions of Instructions to Bidders (ITB) of Tender documents.

8. BBMB reserves the right to cancel / withdraw this invitation for bids without assigning any reason and shall bear no liability whatsoever consequent upon such a decision.

INTERPRETATIONS

1. Words comprising the singular shall include the plural & vice versa.

2. An applicable law shall be construed as reference to such applicable law including its amendments or re-enactments from time to time.

3. A time of day shall save as otherwise provided in any agreement or document be construed as a reference to Indian Standard Time.

4. Different parts of this contract are to be taken as mutually explanatory and supplementary to each other and if there is any differentiation between or among the parts of this contract, they shall be interpreted in a harmonious manner so as to give effect to each part.

   The table of contents and any headings or sub headings in the contract has been inserted for case of reference only & shall not affect the interpretation of this agreement.

BID INFORMATION SHEET

The brief details of the tender are as under:

(A)	**NAME OF WORK/ BRIEF SCOPE OF WORK/ JOB**	Design & Engineering, Procurement & Supply of equipment and materials, mandatory spares, Testing at manufacturers works, multi-level inspections, packing and forwarding, supply, receipt, unloading and storage at site, associated civil works, services, permits, licenses, including statutory approvals (as applicable), installation and incidentals, insurance at all stages, erection, testing and commissioning of cumulative capacity of minimum 11.5 MW (AC) or higher as quoted by bidder at two different locations of BBMB {minimum 10MW (AC) or higher capacity at 400kV substation, BBMB Bhiwani and minimum1.5MW (AC) or higher capacity at 220kV substation, BBMB Hisar} Grid Interactive Solar PV Power Plant and Performance demonstration with associated equipment and materials, handing over of the project to BBMB, Training etc. on Lumpsum Turnkey basis along with Comprehensive Annual Maintenance for Five (5) years extendable for another Five (5) years, from the date of Operational Acceptance. 1. Design, Procurement & Supply and erection of the following, in all respect: 1.1 Solar panels including module mounting structures and fasteners. 1.2 All power conditioning systems including junction boxes, Inverters/ PCU, DC and AC circuit breaker(s). 1.3 All associated electrical works and equipment required for interfacing line/ cable (i.e. IDT/Auxiliary/Power transformers, breakers, isolators, lightning arrestor(s), LT/other panels, protection system, cables, metering etc., but not limited to) as per technical specifications. 1.4 Design, supply, erection, testing & commissioning Cabling/ TL at voltage level defined in scope of work/ TS as per

		project requirement and associated switchgear equipment and metering equipment as per technical specification and state regulations. 1.5 All associated civil works, including Design and Engineering, for: Earthwork for Site grading, cutting, filling, levelling & compacting in requisite project land as required for development of this Solar PV Power Plant 1.6 Construction of module mounting structure as per ground conditions and other power equipment foundations, cable trenches for cable routing and earthing pits. 1.7 Construction of Passage for Cleaning of Solar PV (SPV) Project 1.8 Construction of rain water drainage, as required. 1.9 Setting up of a comprehensive Fire Protection system as per the Hazardous area classification for the site. 1.10 Supply of mandatory spares. 1.11 Demonstration of performance of the plant as per the requirement specified in the bidding documents. 1.12 Comprehensive Annual Maintenance of the SPV plant for Five (5) years extendable for another Five (5) years as mentioned in detailed scope of work from the date of Operational Acceptance, as detailed in technical specification including supply and storage of all spare parts, consumables, repairs / replacement of any defective equipment etc. 1.13 Obtaining all associated statutory and regulatory compliances and approvals for successful construction, commissioning, operation and maintenance of plant. 1.14 The detailed scope of work is given in Section VII: Scope of Work, specifications and Drawings of this bidding document.
(B)	**SALE OF POWER**	Solar Power shall be shared by BBMB partner states (Panjab, Haryana, Rajasthan, Himachal Pradesh and Chandigarh)

(C)	**TENDER NO. & DATE**	642 /BBMB/ P&D(TS) dated 08.02.2023
(D)	**TYPE OF TENDER**	Single Stage Two Envelope Online Bidding system followed by e-Reverse Auction (e-RA).
(E)	**COMPLETION/ CONTRACT PERIOD**	As mentioned in General Conditions of Contract (GCC) and Special Conditions of Contract (SCC).
(F)	**BIDDERS ELIGIBLE FOR BIDDING**	Domestic Competitive Bidding
(G)	**TENDER DOCUMENT FEE** **(Non-Refundable)**	**Amount: INR 5,000/- (Indian Rupees Five thousand only) plus 18% GST as applicable.** Bidders can pay for the cost of tender documents Fees online on e-procure Punjab Portal. The bidder shall be required to forward the copy of electronic fund transfer receipt from their registered E-mail ID to BBMB Email ID- dirpp@bbmb.nic.in and hard copy of the same to be submitted at the below address: - Director / P&D (TS), SLDC Complex, Industrial Area Phase – 1, B.B.M.B, Chandigarh. Telephone No. 0172- 2654468 **Bid submitted without payment of requisite Tender Document Fee will be treated as non-responsive and shall be liable for rejection.**
(H)	**EARNEST MONEY DEPOSIT (EMD)**	**Amount: INR 39,10,000/- (Indian Rupees Thirty-Nine lacs Ten Thousand only).**
(I)	**PERFORMANCE BANK GUARANTEE (PBG)**	Applicable, as detailed in bidding documents

(J)	**Website for downloading of NIT/ uploading of filled in Bid Response Sheets only in e-mode**	https://eproc.punjab.gov.in.
(K)	**DATE, TIME & VENUE OF PRE-BID MEETING & SITE VISIT**	**Pre-Bid Meeting 1100 HRS (IST) on 06.03.2023** Address of Pre-Bid Meeting: - Director / P&D (TS), SLDC Complex, Industrial Area, Phase – 1, B.B.M.B, Chandigarh. Telephone No. 0172- 2654468 Email: dirpp@bbmb.nic.in. **Site Visit:** Prospective Bidders are advised to visit the site to study the actual conditions and go through the plans/ drawings connected to the present scope of work etc. including power evacuation system and get acquainted with the same before attending Pre-bid meeting. For seeking visit of site or any clarifications bidders may contact the Director / P&D (TS), BBMB Chandigarh (e-mail: dirpp@bbmb.nic.in.) **The details regarding Site visit are mentioned in the Instruction to Bidders (ITB). Bidders are required to go through the same.**
(L)	**Document downloading start date & time**	09.02.2023 from 12:00 hrs.
	Document downloading end date & time	10.04.2023 up to 14:00 hrs.

	Bid submission start date & time:	09.02.2023 from 12:00 hrs.
	Bid submission end date & time:	10.04.2023 up to 15.00 hrs.
	Bid opening date & time:	10.04.2023 15:30 hrs. Onwards online on https://eproc.punjab.gov.in.
	Last date of submission of documents in hard copy.	10.04.2023 up to 15.00 hrs.
(M)	**Date and Time Start for E –Reverse Auction**	Will be informed by Purchaser to qualified Bidders
(N)	**Address for submission of sealed hard copy of Techno-commercial bid & opening of Bids & submission of queries regarding NIT, if any.**	DIRECTOR / P&D (TS) SLDC COMPLEX, INDUSTRIAL AREA PHASE - 1 B.B.M.B. CHANDIGARH. Pin code – 160002
(O)	**Currency of bid**	Indian Rupees (INR)
(P)	**Bidder's Eligibility Criteria**	Bidders intending to participate in this bid shall fulfill the Eligibility Criteria as per Section - III (BDS) Qualifying Requirement of the NIT.
(Q)	**Period of bid**	210 days from the date of original opening of Part-1

	Validity	(Techno-Commercial) of tender.
(R)	**Bid evaluation**	Evaluation of bid shall be carried out by per MW (AC) Price basis but minimum cumulative capacity 11.5MW (AC) {Per MW (AC) Price shall be calculated by Grand Total Price of EPC (supply, mandatory spares and service) and AMC divided by quoted cumulative capacity by bidder, but minimum 11.5 MW (AC)}
(S)	**Multiple Bidding system**	Not Allowed.

1. Bids must be submitted strictly in accordance with Clause no. 21 of ITB depending upon Type of Tender as mentioned Bid Information Sheet attached under Section - I (Invitation for Bids, IFB). The IFB is an integral and inseparable part of the Tender document.

2. Bidder(s) are advised to quote strictly as per terms and conditions of the tender documents and not to stipulate any deviations/ exceptions.

3. Any bidder, who meets the Qualifying Requirement and wishes to quote against this tender, may download the complete bidding document along with its amendment(s) if any from Portal ***(https://www.eproc.punjab.gov.in)*** and submit their Bid complete in all respect as per terms & conditions of Tender Document on or before the due date of bid submission.

4. Clarification(s)/ Corrigendum(s) if any shall also be available on above referred websites.

5. Purchaser will release LOA for LSTK (Lumpsum Turnkey)/ EPC (Engineering, Procurement & Commissioning) alongwith AMC for 5 (Five) Years extendable for another 5 (Five) years to the successful bidder in following respective parts as mentioned briefly below:

   i. **Supply Part**: For providing the Ex Works-supply, material including mandatory spares and any other supplies specified in the Tender Documents inclusive of

packing & forwarding charges, Goods & services tax under the scope of Supply.

ii. **Service Part:** For all services i.e., Storage, Handling at Site, freight and insurance, insurance at site, Civil Works, Design, engineering, Erection, Installation, Testing and Commissioning including Performance Testing in respect of all the Equipment's supplied and/or erected under the scope of Supply and any other services specified in the Contract Documents.

iii. **AMC Part:** For providing Comprehensive annual maintenance of the Solar PV plant for Five (5) years extendable for another Five (5) years from the date of Operational Acceptance, as detailed in technical specification including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc.

6. However, the above-mentioned contract award methodology may be modified / changed based on specific project requirements and upon sole discretion of purchaser.

SECTION – II

INSTRUCTION TO BIDDERS (ITB)

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Preamble

This part (Section - II) of the Tender Documents provides the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the Purchaser. It also provides information on bid submission and uploading the bid on portal ***https://www.eproc.punjab.gov***, bid opening, evaluation and on contract award. This Section (Section - II) contains provisions that are to be used unchanged unless Section - III (Bid Data Sheets) and Section - V (Special Conditions of Contract), which consists of provisions that supplement, amend, or specify in detail, information or requirements included in ITB and that are specific to each procurement, states otherwise. If there is a conflict between the provisions of Section – II, Section – III and Section - V, the provisions of Section - V shall prevail.

However, provisions governing the performance of the Contractor, payments under the contract or matters affecting the risks, rights and obligations of the parties under the contract are not included in this section but instead under Section - IV (General Conditions of Contract) and/ or Section - V (Special Conditions of Contract).

Bidders may note that the respective rights of the BBMB and Bidders / Contractors shall be governed by the Tender Documents / Contracts signed between the BBMB and the Contractor for the respective package(s). The provisions of Tender Documents shall always prevail over any other documents in case of contradiction.

Further in all matters arising out of the provisions of this Section - II, Section - III and the Section - V of the Tender Documents, the laws of the Union of India shall be the governing laws and courts of Chandigarh shall have exclusive jurisdiction.

[A] - GENERAL

1 SCOPE OF BID

1.1 The Purchaser wishes to receive Bids as described in the Bidding documents / Tender documents issued by Purchaser.

1.2 SCOPE OF BID: The scope of work/ Services shall be as defined in the Tender documents.

1.3 The successful bidder will be expected to complete the entire scope of work within the period stated in Section - V, Special Conditions of Contract.

1.4 Throughout the Tender Documents, the terms 'Bid', 'Tender' & 'Offer' and their derivatives [Bidder / Tenderer, Bidding Documents / Tender Documents, Bid / Tender/ Offer etc.] are synonymous. Further, 'Day' means 'Calendar Day' and 'Singular' also means 'Plural'.

2 ELIGIBLE BIDDER

Bidder shall meet the following qualification criteria.

2.1 The Bidder or their allied agency(ies) should not be debarred or on the banning list of BBMB / BBMB Partner States (Punjab, Haryana, Himachal Pradesh, Rajasthan and Chandigarh) / Ministry of New & Renewable Energy (MNRE)/Government Department/PSU's for future bidding due to Poor Performance" or "corrupt and fraudulent practices" or any other reason in the past.

If the tender documents were issued inadvertently/ downloaded from website, offers submitted by such bidders shall not be considered for opening/ evaluation/ Award.

In case there is any change in status of the declaration prior to award of contract, the same has to be promptly informed to Purchaser by the bidder.

It shall be the sole responsibility of the bidder to inform Purchaser in case the

bidder or their allied agency(ies) is/are debarred from bidding by BBMB / BBMB Partner States (Punjab, Haryana, Himachal Pradesh, Rajasthan and Chandigarh) / MNRE/ Government Department/PSU's . Concealment of the facts shall tantamount to misrepresentation of facts and shall lead to action against such Bidders rejection of bid and black listing etc.

2.2 The Bidder should not be under any liquidation court receivership or similar proceedings on due date of submission of bid.

In case there is any change in status of the declaration prior to award of contract, the same has to be promptly informed to Purchaser by the bidder.

It shall be the sole responsibility of the bidder to inform Purchaser in case the bidder is under any liquidation court receivership or similar proceedings on due date of submission of bid and during the course of finalization of the tender. Concealment of the facts shall tantamount to misrepresentation of facts and shall lead to action against such Bidders like rejection of bid and black listing etc.

2.3 **Bidders are required to fulfill qualification criteria as detailed in Annexure to Bid Data Sheet (BDS) Qualifying Requirements.**

2.4 Pursuant to qualification criteria set forth in the bidding, the Bidder shall furnish all necessary supporting documentary evidence to establish Bidder's claim of meeting qualification criteria as mentioned in the Annexure to Bid Data Sheet (BDS) Qualifying Requirements.

2.5 Bidders shall be required to upload duly signed authenticated copies of documents for meeting Bidder Qualification Criteria on the e-tendering portal as well hard copy of same to address mentioned in Bid Information Sheet attached under Section - I (Invitation for Bids, IFB).

3 BIDS FROM CONSORTIUM/ JOINT VENTURE

Not Allowed.

4 NUMBER OF BIDS PER BIDDER

A Bidder shall submit only 'one [01] Bid' in the Bidding Process. A Bidder who submits more than 'one [01] Bid' will be disqualified and EMD, if any, submitted by bidder shall be forfeited.

5 COST OF BIDDING & TENDER PROCESSING FEE

5.1 COST OF BIDDING

The Bidder shall bear all costs associated with the preparation and submission of the Bid including but not limited to Bank charges, all courier charges including taxes & duties etc. incurred thereof. Further, BBMB will in no case, be responsible or liable for these costs, regardless of the outcome of the bidding process.

5.2 TENDER PROCESSING FEE (NON-REFUNDABLE)

Bidders can pay for the tender document fee (non- refundable) on e-procure Punjab portal online.

The bidder shall be required to forward the copy of electronic fund transfer receipt from their registered E-mail ID to Email ID- dirpp@bbmb.nic.in and hard copy of the same to be submitted at the below address: -

Director / P&D (TS),

SLDC Complex, Industrial Area,Phase – 1,

B.B.M.B, Chandigarh.

Telephone No. 0172- 2654468

Bid submitted without payment of requisite Tender Processing Fee will be treated as non-responsive and shall be liable for rejection.

6 SITE VISIT

6.1 The Bidder is advised to visit and examine the site of works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into a Contract for the required job. The costs of visiting the site shall be borne by the Bidder.

6.2 The Bidder or any of its personnel or agents shall be granted permission by the

BBMB to enter upon its premises and land for the purpose of such visits, but only upon the express conditions that the Bidder, its personnel and agents will release and indemnify the BBMB from and against all liabilities in respect thereof, and will be responsible for death or injury, loss or damage to property, and any other loss, damage, costs, and expenses incurred as a result of inspection.

6.3 The Bidder shall not be entitled to hold any claim against BBMB for non-compliance due to lack of any kind of pre-requisite information as it is the sole responsibility of the Bidder to obtain all the necessary information with regard to site, surrounding, working conditions, weather etc. on its own before submission of the bid.

6.4 Prospective Bidders are advised to visit the site to study the actual conditions and go through the plans/ drawings connected to the present scope of work including power evacuation system, including ground conditions, availability of water etc. and get acquainted with the same before attending Pre-bid meeting. For seeking visit of site or any clarifications bidders may contact Purchaser as mentioned Bid Information Sheet attached under Section - I (Invitation for Bids, IFB).

6.5 The Bidder at the Bidder's own responsibility, cost and risk shall inspect and examine the site and its surrounding, and shall satisfy themselves fully before submitting bids as to the form and nature of the site, the geological conditions decisive for the success of the project, the means of access to the site, the loading and unloading facilities etc. In general, the Bidders shall themselves obtain all necessary information as to risks, contingencies, and other circumstances susceptible to influence or affect their bids.

6.6 Although certain information is provided in Scope of work of this tender document, it should be checked by the Bidders, any neglect or failure to obtain or confirm such information will not relieve the Bidders from any liability or responsibilities to carry out the works according to the contract. Purchaser will assist the Bidders in obtaining the data required but will not assume responsibility either for the data obtained or for their completeness.

6.7 Bidders shall acquaint themselves on their own responsibility with laws and

regulations in India under which the work is to be performed including those which may influence, in general or in detail, design, supply, transportation, erection, maintenance of the equipment and requirement of manpower. Any failure or neglect to do so will not absolve the potential Contractor from his contractual obligation.

6.8 It is specially emphasized that it shall be the responsibility of the Bidders to have themselves familiarized with the prevailing conditions and that no claim relating thereto for additional payment or adjustment of a Contract price will be acceptable after the submission of their Bid.

6.9 It shall be deemed that the tenderer has visited the site/area and got fully acquainted with the working conditions and other prevalent conditions and fluctuations thereto whether he visits the site/area or not and has taken all the factors into account while quoting his rates.

6.10 Prospective Bidders are advised to carefully read the Tender documents along with Annexures, understand them in the proper perspective and then fill the Technical Bid Format, Commercial Bid Format and Price Bid Format (SOR).

6.11 In connection with the site visit, the bidder shall submit an Undertaking along with the bid.

[B] - BIDDING DOCUMENTS

7 CONTENTS OF TENDER DOCUMENTS

7.1 The contents of Tender Documents are those stated below, and should be read in conjunction with any 'Addendum/ Corrigendum' issued in accordance with "ITB: Clause-9":

- Section-I : Invitation for Bids [IFB]
- Section-II : Instructions to Bidders [ITB]
- Section-III : Bid Data Sheets [BDS]

  Annexure to Bid Data Sheets [Qualifying

Requirements]

- Section-IV : General Conditions of Contract [GCC]
- Section-V : Special Conditions of Contract [SCC]
- Section-VI : Forms and Formats
- Section-VII : Scope of Work & Technical Specifications
- Section-VIII : Schedule of Rates [SOR]/ Price Schedule [PS]/ Format for Price Bid

7.2 The Bidder is expected to examine all instructions, forms, terms & conditions in the Tender Documents. The entire Tender Documents together with all its amendments, clarifications and attachments thereto, shall be considered to be read, understood and accepted by the Bidders. Failure to furnish all information required by the Tender Documents or submission of a Bid not substantially responsive to the Tender Documents in every respect will be at Bidder's risk and may result in the rejection of his Bid. However, Purchaser at its sole discretion may seek clarifications from the Bidders to adjudge the exact content and facts of the Tender Documents.

8 CLARIFICATION OF TENDER DOCUMENTS

8.1 A prospective Bidder requiring any clarification(s) of the Tender Documents may notify Purchaser in writing by E-mail or at Purchaser mailing address indicated in the Bid Information Sheet attached under Section - I (Invitation for Bids, IFB) at least clear Seven days prior to the pre-bid meeting (in cases where pre-bid meeting is scheduled). Purchaser reserves the right to ignore the bidders request for clarification if received beyond the aforesaid period. Purchaser may respond in writing to the request for clarification. Purchaser's response including an explanation of the query, but without identifying the source of the query will be uploaded on Portal https://www.eproc.punjab.gov.in and/or e-mail dirpp@bbmb.nic.in.

8.2 Any clarification or information required by the Bidder but same not received by the Purchaser at clause 8.1 above is liable to be considered as "no clarification/ information required.

8.3 Clarifications sought by the bidders are to be mandatorily submitted in the

Purchaser provided format only provided along with the Tender document. Pre-Bid queries submitted in any other format will not be considered.

9 AMENDMENT OF TENDER DOCUMENTS

9.1 At any time prior to the 'Bid Due Date', Purchaser may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Tender Documents by addenda / corrigendum.

9.2 Any addendum/ corrigendum thus issued shall be part of the Tender Documents and shall be hosted on https://www.eproc.punjab.gov.in. Bidders have to take into account all such addendum/ corrigendum before submitting their bid.

9.3 Purchaser, if consider necessary, may extend the date of submissions of Bid in order to allow the Bidders a reasonable time to furnish their most competitive bid taking into account the amendment issued thereof.

[C] - PREPARATION OF BIDS

10 LANGUAGE OF BID

The bid prepared by the bidder and all correspondence/ drawings and documents relating to the bid exchanged by bidder and Purchaser shall be written in English language alone.

11 DOCUMENTS COMPRISING THE BID

The bid shall be submitted by the Bidder under “Single Stage - Two Envelope” procedure of bidding. Under this procedure, the bid submitted by the Bidder in two envelopes - First Envelope (also referred to as Techno - Commercial Part) and Second Envelope (also referred to as Price Part) shall comprise of the following documents:

11.1 HARD COPY

Hard copy of the bid shall comprise of following documents to be submitted in sealed envelope, as part of First Envelope. The envelope shall bear {the name of Tender, the Tender No. and the words ‘DO NOT OPEN BEFORE’ (due date & time)}.

Contact Persons Name: -
Director P&D(TS), SLDC Complex, INDUSTRIAL. AREA PHASE - 1
B.B.M.B. CHANDIGARH TELEPHONE No. 0172- 2654468
Email: dirpp@bbmb.nic.in

i) Original Non-Refundable Tender Processing Fee as per clause no. 5 of ITB.

ii) 'Covering Letter' on Bidder's 'Letterhead' (in Original) clearly specifying the enclosed contents, as per ‘Annexure- 1’.

iii) EMD in original as per Clause 16 of ITB as per ‘Annexure - 18’ or as prescribed.

iv) Integrity Pact in original as per Clause 38 of ITB as per ‘Annexure - 19.

v) Documents duly signed meeting the requisite Qualifying criterion as per Annexure to Bid Data Sheet (BDS).

vi) Power of Attorney for authorized signatory in non-judicial stamp paper (as per ‘Annexure- 15’).

vii) Copy of Board Resolution.

viii) The Pass-Phrase to decrypt the relevant Bid-Parts (for both Techno-Commercial and Financial) in separate sealed envelopes before the start date and time of the Tender Opening Event (TOE) if applicable.

Bidder shall also upload the scanned copies of all the above-mentioned original documents during online Bid Submission as a part of First envelope.

“**Bidder should explicitly note that no hard copies are to be submitted as a part of Second envelope”.**

11.2 **ONLINE DOCUMENTS/SOFT COPY**

Online documents/Soft copy of the bid shall comprise of following documents to be uploaded on https://www.eproc.punjab.gov.in as per provisions therein.

(A) AS PART OF FIRST ENVELOPE

i. The Electronic Form of the bid for First Envelope (Techno-Commercial), as available on the portal, shall be duly filled.

ii. Scanned copies of all the above-mentioned original documents during online Bid Submission as a part of First envelope and Bid Form for first envelope.

iii. Certificate of incorporation.

iv. Covering letter as per 'Annexure- 1

v. 'Bidder's General Information', as per 'Annexure- 2'

vi. 'No Deviation Confirmation', as per ' Annexure- 6'

vii. 'Bidder's Declaration regarding Banning and Liquidation, court receivership etc.', as per ' Annexure- 7'

viii. 'Declaration on restriction on procurement from certain countries.', as per 'Annexure- 8'

ix. Declaration regarding the procurement of solar Inverters & Solar Modules from Class I Local Suppliers, as per 'Annexure- 10'.

x. 'Bidders Experience as per ' Annexure- 11'

xi. Disclosure for ALMM Compliance as per ' Annexure- 12'

xii. Document showing annual turnover for the financial years as required in Qualifying Requirements (QR) such as annual reports, profit and loss account, net worth etc. along with information as sought in enclosed Annexure– 13 (Format of Chartered Accountant certificate for financial capability of the bidder).

xiii. E-Banking Format (as per 'Annexure- 14')

xiv. Power of Attorney for bidding company, as per ' Annexure- 15'.

xv. Format for Cyber Security Agreement, as per ' Annexure- 16'

xvi. Undertaking regarding Site Condition, as per ' Annexure- 17'

xvii. Format of Bank Guarantee for Earnest Money Deposit (EMD), as per 'Annexure-18'

xviii. Format for Integrity Pact as per ' Annexure- 19'

xix. Self-Certification undertaking by the bidder- qualifications criteria documents and credentials, as per ' Annexure- 20'

xx. Documents in accordance with the "Qualifying Requirements (QR)" establishing the qualification.

xxi. Tender Document. (Original Tender Document, amendments and clarifications to Tender Documents duly sealed and signed/ digitally signed by the Authorized Signatory).

For convenience, the Bid shall be compiled in the form of specific Sections conforming to the above. In case of non-submission of above documents or submission of incomplete documents, the Purchaser reserves the right not to evaluate such offers further and not to enter into correspondence in this regard after opening the Techno-commercial Bid.

NOTE: The Institute of Chartered Accountant of India at its 379th council meeting dated 17- 18th December, 2018 made generation of Unique Document Identification Number (UDIN) mandatory for every signature of full time practicing chartered accountant for the following service:

a) All certificates with effect from 1st February, 2019.
b) GST and Income Tax audit with effect from 1st April, 2019.
c) All audit and assurance functions with effect from 1st July, 2019.

In view of the above, bidder shall ensure that any certificate / reports issued / attested by a practicing-chartered accountant in India and submitted in the bid shall mandatorily include the UDIN number. Certificate / reports issued / attested without UDIN number of practicing Chartered accountant in India shall not be considered for evaluation.

(B) AS PART OF SECOND ENVELOPE

i. The Electronic Form of the bid for Second Envelope (Price - Part), as available on the portal, shall be duly filled. “Termed as ELECTRONIC FORM”.

ii. Main Price Bid comprising of Schedule of Rates (SOR) 1 to 5 of the Price Schedule (available in Section - VIII, SOR), .

Note: -

This part shall not contain any condition whatsoever failing which the Bids shall be liable to be rejected. No stipulation, deviation, terms & conditions, presumption, basis etc. shall be stipulated in Price Part of the bid. Any condition if stipulated shall be treated as null and void and shall render the bid liable for rejection.

12 SCHEDULE OF RATES/ PRICE SCHEDULE/ BID PRICES

12.1 Unless stated otherwise in the Tender Documents, the Contract shall be for the whole works as described in Tender Documents, based on the rates and prices submitted by the Bidder and accepted by the BBMB. The prices quoted by the Bidders should indicate clearly the Goods & Service Tax (GST) components as also mentioned under the Schedule of Rates.

12.2 Prices must be filled in formats for "Schedule of Rates" enclosed as part of Tender documents under Section - VIII. If quoted in separate typed sheets and any variation in item description, unit or quantity is noticed, such bids may be rejected.

12.3 Bidder shall quote for all the items of "Schedule of Rates " after careful analysis of cost involved for the performance of the completed item considering all parts of the Tender Document. In case any activity though specifically not covered in description of item under " Schedule of Rates " but is required to complete the works as per Specifications, Scope of Work/ Service, Standards, "GCC", "SCC" or any other part of Bidding Document, the prices quoted shall deemed to be inclusive of cost incurred for such activity.

12.4 All Goods & Service Tax (GST) payable by the Contractor under the Contract, or for any other cause, shall be mentioned as per the Schedule of Rates formats.

12.5 Prices quoted by the Bidder, shall remain FIRM and Fixed and valid until completion of the Contract and will not be subject to variation on any account.

12.6 In case of any variation (positive/ negative) in existing rates of taxes/ duties/ levies or a new tax/ duty/ levy is introduced or any existing tax/ duty/ levy is abolished or application of any Tax in the course of the performance of this Contract, which will/ may impact the overall pricing in connection with performance of the

Contract, an equitable adjustment of the Contract Price shall be made to factor any such change by addition to the Contract Price or deduction therefrom, as the case may. All these adjustments would be carried out by considering the base price of GST/taxes equivalent to the amount mentioned under GST/taxes column of the Schedule of rates.

The term Change in Law shall refer to the occurrence of any of the following events pertaining to this project only after the date seven (7) days prior to the date of Bid submission, including (i) the enactment of any new law; or (ii) an amendment, modification or repeal of an existing law; or (iii) any change in the rates of any Taxes including any duties and cess or introduction of any new tax made applicable for setting up the project.

However, Change in Law shall not include (i) any change in taxes on corporate income or (ii) any change in any withholding tax on income or dividends distributed to the shareholders of the Contractor, or (iii) any change on account of regulatory measures by the Appropriate Commission.

However, any increase in the rate of these taxes, duties and levies beyond the contractual completion period shall be to Contractor's account and any decrease shall be passed on to BBMB.

12.7 The Bidder shall quote the prices in 'figures' & words. There should not be any discrepancy between the prices indicated in figures and the price indicated in words. In case of any discrepancy, the same shall be dealt as per clause no. 30 of ITB.

12.8 Bidder need to submit the detailed break-up of Goods & Service Tax (GST) in the Schedule of rates formats. This data is required to ascertain the:

a) Computation of taxes assumed at the time of bidding.
b) The total impact due to revision in applicable tax rate or introduction of new tax, if any.

Bidders are required to ascertain the correctness of amount related to Goods & Service Tax (GST) as mentioned in the Schedule of Rates as on the date of

techno-commercial bid opening as it will impact the Price assessment part at the time of evaluation of price bid.

13 GOODS & SERVICE TAX (GST)

13.1 The statutory payment of GST and other taxes, if any, will be made extra at the rate as applicable at the time of supply but limited to the rates prevailing within contractual completion period. The bidder shall submit the following certificate for claiming payment in respect of GST: -

i) Certified that the transaction on which GST is claimed has been/shall be included in the return submitted/to be submitted under GST law and the amount claimed from BBMB has been deposited/ shall be deposited with GST authorities.

ii) Certified that the supplies on which GST has been charged have not been exempted under the GST Act or rule made there under and that GST charged on these supplies is not more than what is payable under the provisions of relevant act.

iii) Certified that we shall indemnify the BBMB, in case, it is found at a later stage that wrong or incorrect payment has been received on account of GST. The same will be refunded.

iv) Certified that we are registered under GST Act and our registration no is……..

v) Further, any loss due to non-availability of ITC or levy of penalty/ interest payable by BBMB on account of non-filing of return or non-compliance or any miss-statement given under the provisions of GST Act by the contractor shall be recoverable from us.

13.2 Contractor shall mandatorily obtain the registration under GST Law at Central level and/or in respective State as may be required. Further, Contractor shall mandatorily file returns under GST before their due date & comply with the requirements of the Law within timelines. Before releasing the payment to the Contractor. BBMB shall not be responsible for any delay in payment release to the contractor in case the GST compliance is not fulfilled from the contractor side in any manner.

13.3 Contractor shall be responsible to comply with all the requirements of applicable provisions of GST. Contractor has to mandatorily get registered under GST at

Central and relevant State(s). Contractor shall file all the returns on timely basis and upload all the Invoices and acceptance thereof as may be required under the provisions of GST. In case, it is found that BBMB is not able to take Input Tax Credit (ITC) benefit of the taxes due to any fault of the Contractor, BBMB shall be constrained to deduct the amount from the payments to be made to the Contractor or recover the same in any other manner.

13.4 Bidders are required to submit a copy of the GST Registration Certificate or GST provisional certificate while submitting the bids wherever GST tax is applicable.

13.5 The responsibility of payment of GST lies with the Service Provider only. Contractor providing taxable service shall issue an Invoice, a Bill or as the case may be, a Challan which is signed, serially numbered and in accordance with rule GST Law. The invoice shall also contain the following:

a) Name, Address & Registration No. of such Person/ Contractor.
b) Name & Address of the Person/ Contractor receiving Taxable Service.
c) Description, Classification & Value of Taxable Service provided.
d) GST Amount, if any.
e) HSN code of the Goods/Services.

Payments to Service Provider for claiming GST amount will be made provided the above formalities are fulfilled. Further, BBMB may seek copies of challan and certificate from Chartered Accountant for deposit of GST collected from BBMB.

13.6 In case CBIT (Central Board of Indirect Taxes and Customs) brings to the notice of BBMB that the contractor has not remitted the amount towards GST collected from BBMB to the government exchequer, then, that contractor may be debarred from bidding in future tenders of BBMB for given period as per the sole discretion of BBMB.

13.7 In case of statutory variation in GST during currency of the Contract, the Contractor shall submit a copy of the 'Government Notification' to evidence the date of revision. Claim for payment of GST / Statutory variation in GST, should be raised within two [02] months from the date of issue of 'Government Notification' for payment of differential (in %) GST, otherwise claim in respect of above shall

not be entertained for payment of arrears. The following may also be noted:

Any increase in the rate of GST beyond the contractual completion period shall be to contractor's account whereas any decrease in the rate shall be passed on to the BBMB.

13.8 BBMB will reimburse the GST to the Contractor at actuals against submission of invoices issued in accordance with GST rules. In case of any variation in the executed quantities, the amount on which the GST is applicable shall be modified in same proportion.

13.9 BBMB will reimburse the GST to the Contractor at actuals against documentary evidence subject to the ceiling amount of GST as quoted by the bidder, subject to any statutory variations. In case of any variation in the executed quantities the ceiling amount on which GST is applicable will be modified on pro-rata basis.

13.10 Contractor shall ensure timely submission of correct invoice(s) with all required supporting document(s) so to enable Owner to avail Input Tax Credit (ITC) (If applicable).

14 BID CURRENCIES

Bidders must submit bid in Indian Rupees (INR) only.

15 BID VALIDITY

15.1 Offers/quotations must be valid, at least, for 210 days from the date of original opening of Part-1 (Techno commercial) of tender. The offers falling short of the required validity period shall be liable to rejection.

15.2 In exceptional circumstances, prior to expiry of the original 'Bid Validity Period', the purchaser may request the Bidders to extend the 'Period of Bid Validity' for a specified additional period. The request and the responses thereto shall be made in writing or by email. A Bidder may refuse the request without forfeiture of his 'EMD'. A Bidder agreeing to the request will not be required or permitted to modify his Bid, but will be required to extend the validity of its 'EMD' for the period of the extension and in accordance with "ITB: Clause-16" in all respects.

Note: In case of extension(s) of last due date of the Tender submission, the latest extension issued shall be considered as the final due date of Tender submission and accordingly the Tender validity should be calculated and sufficed. The validity of the Tender need to be revised by respective bidders, in case the bids are already submitted prior to the last due date of the initial Tender submission deadline.

16 EARNEST MONEY DEPOSIT (EMD)

(A) EMD will be submitted by the bidders jointly for the cumulative capacity quoted by bidder but minimum 11.5 MW (AC).

The Bidder shall furnish, as part of its bid, bid guarantee for an amount as specified in the Bid Information Sheet attached under Section - I (Invitation for Bids, IFB). The bid guarantee shall be valid for a period of twelve (12) months from the date of opening of bid in the first instance. This guarantee shall be revalidated subsequently for a further period, if required by the Purchaser with the prior consent of the bidder.

The bid security is required to protect the Purchaser against the risk of Bidder's contract, which would warrant the guarantee forfeiture, pursuant to Clause 16. The bid guarantee shall be made payable to the Purchaser without any condition whatsoever.

16.1 If the requisite amount of Earnest Money has not been received from bidders, except those which are exempted as given below, their tenders shall not be opened/ considered. The EMD or proof of exemption strictly in line as detailed below shall be enclosed in a sealed envelope marked "Earnest Money Deposit – NIT No. Dated " and must be received at the address below before date & time of submission of bid. The tender shall be opened only after the envelope containing EMD has been received by this office and contents found in order. The EMD shall be in the amount stipulated in Bid Information Sheet attached under Section - I (Invitation for Bids, IFB).

Address for submission of EMD:

THE DIRECTOR,

PLANNING & DESIGN (TS) DIRECTORATE

SLDC COMPLEX, INDUSTRIAL. AREA PHASE-I,

BBMB, CHANDIGARH-160002

16.2 The Bidder shall furnish, as part of its bid, a bid security as specified in Bid Information Sheet attached under Section - I (Invitation for Bids, IFB). Earnest money deposit must reach the above address before the opening time of the bids; otherwise, the tender shall not be opened. EMD shall be submitted in the form of demand draft drawn in favour of the Sr. Accounts Officer, BBMB, Chandigarh/ EMD may be furnished in the shape of Bank Guarantee (Annexure - 18). Tenders unaccompanied with the prescribed earnest money shall be rejected out rightly and shall not be read at the time of opening of tenders even if it conforms to all other conditions & terms of enquiry. Earnest money in the form of a cheque or any other form, not specifically approved by the BBMB, shall not be accepted under any circumstances.

16.3 Permanent Earnest Money deposit (PEMD) of Rs.1.0 lac each in respect of Chief Engineer/Generation, Director/P&D(PPs), Director/P&D(TS), Director/PR, Chief Engineer/Bhakra Dam, Chief Engineer/ Beas Dam & Chief Engineer/BSL shall be deposited by the firms who are willing to avail the facility of PEMD. However, the exemption from furnishing EMD by such firms against clause 16.5 (c) below shall be given only if the PEMD has been deposited in respect of the offices mentioned above in which the tender is to be processed. In case, the Bidders who have deposited permanent EMD of Rs. One lac with BBMB, they shall be required to furnish balance EMD amount to the extent their permanent EMD is less that the amount specified in as above clause 16.2 . In case, order is placed on such a bidder, he shall be required to top on the furnished EMD amount to make it equivalent to the Security Deposit, so as to ensure equal applicability of clause 16.4 below to such a bidder.

16.4 The successful tenderer on whom the Letter of Award (LOA) is placed shall be required to submit the Security deposit for faithful and satisfactory execution of the LOA/Contract up to faithful execution of work including AMC period without any exception to the exempted categories (refer clause 16.5 below) @1% (One) of the ordered value rounded off to the multiple of Rs. 10/- on the higher side within 7 days of receipt of LOA through Bank Draft/ Bank Guarantee (Annexure - 22). The submitted EMDs shall be thereafter released to the successful tenderer after

receipt of Security deposit. Successful tenderer even exempted from the EMD will also have to submit the Security deposit.

a) The Bid Security of the unsuccessful bidders, shall be returned within 30 (thirty) days from the date of issue of 'Letter of Award' to the successful Bidder".
b) BBMB shall not be liable to pay any bank charges, commissioning or interest etc. on the amount of EMD.

16.5 However, the following will be exempted from furnishing Earnest Money with their tender:

a) Public Sector undertakings of the Central/State Govt. Provided that a certificate issued by the Central/State Govt. certifying that the tenderer submitting the tender is an undertaking of the Central/concerned State Govt. is enclosed with the tender by the tenderer claiming exemption from furnishing Earnest Money. Company asking for EMD exemption shall have to certify that the Government equity in the company is not less than 51%.
b) Firms borne on the Bhakra Beas Management Board's approved list of Bidders who may have deposited a permanent Earnest Money deposit of Rs.1,00,000/- with the Bhakra Beas Management Board as per clause 16.3 above provided that the relevant registration Number as given by BBMB is quoted in the tender claiming exemption from furnishing earnest money.
c) Small Scale industries only for those items for which they are registered with the Director of Industries of all Partner State Govt. of BHAKRA BEAS MANAGEMENT BOARD/Central Govt., National Small Industries Corporation Ltd. New Delhi. Provided that a copy of the relevant letter from the concerned Director of Industries or National Small Industries Corporation Limited, New Delhi containing Registration No. and confirming registration of the tenderer with the said authority is enclosed with the tender by the tenderer claiming exemption from furnishing Earnest Money.

(B) THE EARNEST MONEY/SECURITY DEPOSIT FURNISHED BY THE TENDERER SHALL BE FORFEITED IN PART OR IN FULL UNDER THE FOLLOWING CIRCUMSTANCES.

a) If the tenderer withdraws his tender at any stage during the currency of his validity period, his earnest money shall stand forfeited in full.

b) If the Letter of Award (LOA) has been issued but the bidder refuses to comply with it, the earnest money deposited by him shall be forfeited in full, irrespective of the fact whether the Board sustains any loss on account of his default or not. This forfeiture shall be without prejudice to the right of the Board to claim any other damages as admissible under the law as well as to take such executive action against the Bidder as black listing etc.

c) Where the LOA has been accepted but the Bidder stops making the supplies after partially fulfilling the LOA, the security deposit shall be retained and adjusted against any loss that may be caused to the Board through risk purchase from alternative source and/or any other damages recoverable from the bidder under the terms of the contract.

d) In the event of a breach of contract in any manner, the Security Deposit shall be forfeited and adjusted against the claim of the Board on the bidder for any damages or for any loss sustained by the Board on account of such breach.

e) Security deposits not claimed within three years from the date of completion of contract, including the period of Defect liability & AMC shall be treated as lapsed Deposits and no claim for a refund thereof shall be entertained from the bidder thereafter.

Note: In case of extension(s) of last due date of the Tender submission, the latest extension issued shall be considered as the final due date of Tender submission and accordingly the Earnest Money Deposit validity and Bid validity should be calculated and sufficed. The validity of the submitted EMD and bid validity need to be revised by respective bidders, in case the bids are already submitted prior to the last due date of the initial Tender submission deadline.

17 PRE-BID MEETING

17.1 The Bidder(s) or his designated representative are invited to attend a "Pre-Bid Meeting" which will be held at address specified in Bid Information Sheet attached under Section - I (Invitation for Bids, IFB). It is expected that a bidder shall not depute more than 02 representatives for the meeting.

17.2 Purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

17.3 Text of the questions raised and the responses given, together with any responses prepared after the meeting, will be uploaded on www.eproc.punjab.gov.in against the Tender. Any modification of the Contents of Tender Documents listed in "ITB: Clause-7, that may become necessary as a result of the Pre-Bid Meeting shall be made by the Purchaser exclusively through the issue of an Addendum/ Corrigendum pursuant to "ITB: Clause-9", and not through the minutes of the Pre-Bid Meeting.

17.4 Non-attendance of the Pre-Bid Meeting will not be a cause for disqualification of Bidder.

18 FORMAT AND SIGNING OF BID

18.1 The Bid submitted by the Bidder must be digitally signed by the person duly authorized to sign on behalf of the Bidder. Each page of the Bid should be numbered and properly signed. Contents and pages should be indicated in the index page. The name of the person signing the bid should also be typed or printed below the signature.

18.2 Bid must be signed with the legal name of the Corporation /Company by the person authorized to sign the bid on behalf of such Corporation / Company in the matter.

18.3 Satisfactory evidence of authority of the person signing on behalf of the bidder shall be furnished on non-judicial stamp paper of an appropriate value with the hard copy of bid in the form of a Power of Attorney, duly notarized by a Notary Public along with copy of Board Resolution (in original or notary attested copy), indicating that the person signing the bid has the authority to sign the bid and that the bid is binding upon the bidder during the full period of its validity.

18.4 Each Bid shall contain no overwriting, alterations, omissions, or additions, unless such corrections are initiated by the person or persons signing the Bid. Corrections if any shall only be made by scoring out the cancelled portion, writing the correction, initiating and dating it by the person or persons signing the Bid.

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

18.6 The Bid must be typed or written in indelible ink and signed and sealed at each page by the Bidder with his usual signature before submission.

18.7 The Bidder's name stated on the proposal shall be the legal exact name of the firm.

18.8 Bids not conforming to the above requirement of signing even after the clarifications sought in this regard by the purchaser, shall be disqualified.

19 ZERO DEVIATION BIDDING

This enquiry is issued on "Zero Deviation Bidding" basis.

Deviation **to terms and conditions of Tender Documents may lead to rejection of bid.** Purchaser will accept bids based on terms & conditions of Tender Documents only. Bidder may note Purchaser will determine the substantial responsiveness of each bid to the Tender Documents pursuant to provision contained in clause 29 of ITB. For purpose of this, a substantially responsive bid is one which conforms to all terms and conditions of the Tender Documents without deviations or reservations. Purchaser determination of a bid's responsiveness is based on the content of the bid itself without recourse to extrinsic evidence. Purchaser reserves the right to raise technical and/ or commercial query(ies), if required. The response(s) to the same shall be in writing, and no change in the price(s) or substance of the bids shall be sought, offered or permitted. The substance of the bid includes but not limited to prices, completion, scope, technical specifications, etc. Bidders are requested to not to take any deviation.

Note: Further, it is once again reminded not to mention any condition in the Bid which is contradictory to the terms and conditions of Tender document.

20 E-PAYMENT

To facilitate the payments electronically through 'e-banking', the successful bidder should give the details of his bank account as per the bank mandate form enclosed at Annexure - 14 in Section-VI, Sample Forms and Formats of the Tender documents.

[D] - SUBMISSION OF BIDS

21 SUBMISSION, SEALING AND MARKING OF BIDS

21.1 Bids shall be submitted through e-tender mode in the manner specified elsewhere in tender document.

21.2 Hard Copies (Specific documents only) as mentioned in clause no. 11.1 of Section - II, Instructions to Bidders (ITB) of the Tender document shall be submitted in a Sealed Covering Envelope. The Covering Envelope shall have the following Sticker:

Offline Tender Document for "Tender for Design, Engineering, Supply, Construction, Erection, Testing, commissioning, Mandatory Spares and AMC of Cumulative minimum 11.5 MW (AC) or higher capacity as quoted by bidder Ground based Solar PV Power Plant at Two different sites BBMB"	
Tender Document No.	
Last Date of Submission	
Bids Submitted by	(Enter Full name and address of the Bidder)
Authorized Signatory	(Signature of the Authorized Signatory) (Name of the Authorized Signatory) (Stamp of the Bidder)
Bid Submitted to	Director / P&D (TS), SLDC Complex, Industrial Area, Phase – 1, B.B.M.B, Chandigarh. Telephone No. 0172- 2654468 Email: dirpp@bbmb.nic.in.

21.3 All the bids shall be addressed to the Purchaser at address specified in the Bid Information Sheet in Section - I, Invitation for Bids (IFB).

21.4 Bids submitted under the name of agent/ consultant/ representative/retainer/ associate etc. on behalf of a bidder/ affiliate shall not be accepted.

22 DEADLINE FOR SUBMISSION OF BIDS

22.1 The bids must be submitted through e-tender mode not later than the date and time specified in the Bid Information Sheet in Section - I, Invitation for Bids (IFB).

22.2 The hard copies of required specific documents must be submitted through courier/ registered post/ by hand not later than the date and time specified in the Bid Information Sheet in Section - I, Invitation for Bids (IFB).

22.3 BBMB may, in exceptional circumstances and at its discretion, extend the deadline for submission of Bids (clause 9 of ITB refers). In which case all rights and obligations of BBMB and the Bidders, previously subject to the original deadline will thereafter be subject to the deadline as extended. Notice for extension of bid submission date will be uploaded on https://www.eproc.punjab.gov.in

23 LATE BIDS

23.1 Any bids received after the notified date and time of closing of tenders will be treated as late bids.

23.2 E-tendering system shall close immediately after the deadline for submission of bid and no bids can be submitted thereafter.

23.3 Unsolicited Bids or Bids received to address other than one specifically stipulated in the tender document will not be considered for evaluation/ opening/ award if not received to the specified destination within stipulated date & time.

24 MODIFICATION AND WITHDRAWAL OF BIDS

24.1 Modification and withdrawal of bids shall be as follows: -

The bidder may withdraw or modify its bid after bid submission but before the due

date and time for submission as per tender document with the due written consent from the authorized signatory of the bidder.

24.2 The modification shall also the prepared, sealed, marked and dispatched in accordance with the provision of the clause 21 of ITB, with the after and inner envelopes additionally marked modification or withdrawal as appropriate. A withdrawal notice may also be sent by e-mail or fax but followed by a signed confirmation copy post not later than the deadline for submission of bids. No bid shall be modified/ withdrawn after the deadline for submission of bids.

24.3 No bid shall be allowed to be withdrawn/ modified/ substitute in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the bidder on the Bid Form. Withdrawal/ Modification/ Substitution of a bid during this interval shall result in the forfeiture of bidder's EMD pursuant to clause 16 of ITB and rejection of bid.

24.4 The latest bid hence submitted shall be considered for evaluation and all other bids shall be considered to be unconditionally withdrawn.

24.5 In case after price bid opening the lowest evaluated bidder (L1) is not awarded the job for any mistake committed by him in bidding or withdrawal of bid or modification of bid or varying any term in regard thereof leading to re-tendering, BBMB shall forfeit EMD paid by the bidder and such bidders shall be debarred from participation in re-tendering of the same job(s)/ item(s). Further, such bidder will be debarred for a given period as decided by BBMB after following the due procedure.

25 PURCHASER'S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS

BBMB reserves the right to accept or reject any Bid, and to annul the Bidding process and reject all Bids, at any time prior to award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligations to inform the affected Bidder or Bidders of the ground for BBMB's action. However, Bidder if so, desire may seek the reason (in writing) for rejection of their Bid to which BBMB shall respond quickly.

[E] - BID OPENING AND EVALUATION

26 BID OPENING

26.1 OPENING OF TECHNO-COMMERCIAL PART OF BID (PART-1)

26.1.1 Techno-Commercial Part (Part-I) and EMD will be opened on the scheduled date and time. In case the date of opening of tenders falls on a holiday or holiday is subsequently declared on that date the tenders will be opened on the next working day following the holiday. Corrigendum for extending dates due to this (i.e. holiday/declaration of holiday) shall have to be issued on the e-procurement portal.

26.1.2 Bidders can witness bid opening details by logging on to the E-Tendering Portal through their system.

26.2 OPENING OF PRICE PART OF BID (PART-II)

26.2.1 Priced bid of only those bidders, whose bids are considered techno-commercially acceptable, shall be opened.

26.2.2 The date of opening of the Part-II (Price Bid) shall be intimated only to those bidders whose Part-I of the tender is found to be techno-commercially acceptable.

26.2.3 The price bids of those bidders who were not found to be techno-commercially acceptable shall not be opened.

26.2.4 Bidders can witness bid opening details by logging on to the E-Tendering Portal through their system

27 CONFIDENTIALITY

Information relating to the examination, clarification, evaluation, and comparison of Bids, and recommendations for the award of a Contract, shall not be disclosed to Bidders or any other persons not officially concerned with such process. Any effort by a Bidder to influence the BBMB's processing of Bids or award decisions may

result in the rejection of the Bidder's Bid and action shall be initiated as per procedure in this regard.

28 CONTACTING THE PURCHASER

28.1 From the time of Bid opening to the time of award of Contract, if any Bidder wishes to contact to BBMB on any matter related to the Bid, it should do so in writing. Information relating to the examination, clarification, evaluation & recommendation for award shall not be disclosed.

28.2 Any effort by the Bidder to influence the BBMB in its 'Bid Evaluation', 'Bid Comparison', or 'Contract Award' decisions may result in the rejection of the Bidder's Bid and action shall be initiated as per procedure in this regard.

29 EXAMINATION OF BIDS AND DETERMINATION OF RESPONSIVENESS

29.1 The BBMB's determination of a bid's responsiveness is based on the content of the bid only. Prior to the detailed evaluation of Bids, BBMB will determine whether each Bid: -

a) Meets the "Bid Evaluation Criteria" of the Bidding Documents;
b) Has been properly signed;
c) Is accompanied by the required 'Earnest Money Deposit' if applicable and 'Tender Document Fees',
d) Is substantially responsive to the requirements of the Tender Documents; and
e) Provides any clarification and/ or substantiation that the BBMB may require to determine responsiveness pursuant to "ITB: Clause-29.2"

29.2 A substantially responsive Bid is one which conforms to all the terms, conditions and specifications of the Tender Documents without material deviations or reservations or omissions for this purpose BBMB defines the foregoing terms below: -

a) "Deviation" is departure from the requirement specified in the tender documents.
b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirement in the tender documents.
c) "Omission" is the failure to submit part or all of the information or documentation required in the tender document.

29.3 A material deviation, reservation or omission is one that,

29.3.1 If accepted would,

a) Affect in any substantial way the scope, quality, or performance of the job as specified in tender documents.
b) Limit, in any substantial way, inconsistent with the Tender Document, the BBMB rights or the tenderer's obligations under the proposed Contract.

29.3.2 If rectified, would unfairly affect the competitive position of other bidders presenting substantially responsive bids.

a) BBMB shall examine all aspects of the bid to confirm that all requirements have been met without any material deviation, reservation or omission.
b) If a Bid is not substantially responsive, it may be rejected by the BBMB and may not subsequently be made responsive by correction or withdrawal of the of material deviation, reservation or omission.

30 CORRECTION OF ERRORS

30.1 If there is a discrepancy between the unit price and the total price, which is obtained by multiplying the unit price and quantity specified by the Purchaser, or between subtotals and the total price, the unit or subtotal price shall prevail, and the quantity and the total price shall be corrected. However, in case of items quoted without indicating any quantity or the items for which the quantities are to be estimated by the Bidder, the total price quoted against such items shall prevail. If there is a discrepancy between words and figures, the amount in words will prevail.

The prices of all such item(s) against which the Bidder has not quoted rates/ amount (viz., items left blank or against which '-' is indicated) in the Price Schedules will be deemed to have been included in other item(s).

The subtotal, total price or the total bid price to be identified in Bid Form for this purpose, irrespective of the discrepancy between the amount for the same indicated in words or figures shall be rectified in line with the procedure explained above.

The Bidder should ensure that the prices furnished in various price schedules are consistent with each other. In case of any inconsistency in the prices furnished in the specified price schedules to be identified in Bid Form for this purpose, the BBMB shall be entitled to consider the highest price for the purpose of evaluation and for the purpose of award of the Contract use the lowest of the prices in these schedules.

30.2 The amount stated in the bid will be adjusted by the BBMB in accordance with the above procedure for the correction of errors. If the bidder does not accept the corrected amount of bid, its bid will be rejected.

31 CONVERSION TO SINGLE CURRENCY FOR COMPARISON OF BIDS

All bids submitted must be in the currency specified at clause 14 of ITB.

32 EVALUATION OF BIDS & E- REVERSE AUCTION

Bid shall be evaluated as per evaluation criteria mentioned below. BBMB shall only use the criteria and methodology indicated in the Tender documents. No other criteria/ methodology shall be permitted.

Bidders are required to bid for cumulative minimum 11.5 MW(AC) or higher capacity. In case bidder quote cumulative capacity less than 11.5 MW(AC) their bid shall be rejected.

32.1 EVALUATION OF TECHNO - COMMERCIAL PART (FIRST ENVELOPE)

BBMB will carry out a detailed evaluation of the bids of the qualified bidders in order to determine whether the technical aspects are in accordance with the requirements set forth in the Bidding Documents. In order to reach such a determination, BBMB will examine the information supplied by the bidders, pursuant to ITB Clause 11, and other requirements in the Bidding Documents, taking into account the following factors:

a) Overall completeness and compliance with the Technical Specifications and Drawings to the bid. The bid that does not meet minimum acceptable standards of completeness, consistency and detail may be rejected for non-responsiveness.
b) compliance with the time schedule.
c) Any other relevant technical factors that the BBMB deems necessary or

prudent to take into consideration.

d) Any deviations to the commercial and contractual provisions stipulated in the Tender Documents.

e) Details furnished by the bidder in response to the requirements specified in the Tender Documents.

32.2 OPENING OF SECOND ENVELOPE BY EMPLOYER

The Second Envelope i.e., Price Part of only those Bidders shall be opened who are determined as having submitted substantially responsive bids and are ascertained to be qualified to satisfactorily perform the Contract, pursuant to ITB Clause 32.1. A negative determination of the bids pursuant to ITB Clause 32.1 the Second Envelope submitted by such bidders shall be sent to archive unopened i.e. Price bid shall not be opened (bid rejected) and the EMD shall be returned as per the Tender provisions.

The prices and details as filled up in Electronic Form by the bidder on e-Portal and opened during the bid opening and recorded in the Bid Opening Statement would not be construed to determine the relative ranking amongst the Bidders, or the successful Bidder, and would not confer any right or claim whatsoever on any Bidder. The successful Bidder (also referred to as the L1 Bidder) shall be determined as per the provisions of this Section - II and considered for award of contract as provided in ITB.

32.3 EVALUATION OF FINANCIAL PART (SECOND ENVELOPE)

32.3.1 BBMB will examine the Price Parts (Second Envelopes) to determine whether they are complete, whether any computational errors have been made, whether the documents have been properly signed, and whether the bids are generally in order.

32.3.2 The Price Part containing any deviations and omissions from the contractual and commercial conditions and the Technical Specifications which have not been identified in the First Envelope are liable to be rejected.

32.3.3 Arithmetical errors will be rectified in line with Clause no. 30 of ITB.

32.3.4 **The comparison shall also include the impact of Goods & Service Tax (GST)**

in line with the provisions of the Bidding Documents.

32.3.5 The Employer's comparison will include the costs resulting from application of the evaluation procedures described below:

The Evaluated Bid Value (EBV) shall be calculated using the following method (SOR-5):

i. **Schedule of Rates (SOR - 1) i.e. Supply Part** : For providing the Ex Works supply, material including mandatory spares and any other supplies specified in the Tender Documents inclusive of packing & forwarding charges, Goods & services tax under the scope of Supply.

ii. **Schedule of Rates (SOR - 2) i.e. Service Part:** For all services i.e., Storage, Handling at Site, freight and insurance, insurance at site, Civil Works, Design, engineering, Erection, Installation, Testing and Commissioning including Performance Testing in respect of all the Equipment's supplied and/or erected under the scope of Supply and any other services specified in the Contract Documents.

iii. **Schedule of Rates (SOR - 3) i.e. AMC Part:** For providing Comprehensive annual maintenance of the Solar PV plant for Ten (10) Years {Five (5) years extendable for another Five (5) years} from the date of Operational Acceptance, as detailed in technical specification including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc.

Price of AMC for evaluation of Bid shall be considered for Ten (10) years as per Schedule of Rates for AMC (SOR-3).

iv. **Schedule of Rate (SOR-4) i.e. Quoted Capacity {MW(AC)}:** Quoted cumulative capacity by bidder but minimum cumulative capacity 11.5 MW(AC).

v. **Schedule of Rate (SOR-5) i.e. Price per MW (AC)**: Grand Total of Schedule of Rates SOR- 1 to 3 divided by cumulative capacity quoted by bidder but minimum cumulative capacity 11.5 MW(AC) as per SOR-4, to calculate per MW (AC) price.

Evaluated Bid Value (EBV) is as per Schedule No 5/SOR 5 i.e. Price per MW (AC) and same shall be used for e-RA.

The exact format for sharing the base price and all Goods & Service Tax is attached in "Schedule of Rates". Detailed Taxation Break up for this purpose is also given in the Schedule of Price for the Evaluated Bid Value (EBV) calculation purpose.

32.4 EVALUATION OF PRICE BID

Following factors shall be considered for evaluation of Price Bids:

i. Evaluated Bid Values (EBV) for all the Bidders shall be compared to determine the lowest Evaluated Bid Value (EBV) as given under Schedule No- 5 (SOR-5) Format of Schedule of Rates & the lowest (L1) evaluated Bid as such, will be selected for the Notification of Award (NOA) subject to the successful bidder selected after E-Ra .

ii. The per MW (AC) Price will be considered up to 2 decimal places only.

iii. Bidder with lowest EBV i.e. per MW (AC) price will be L-1, Bidder with second lowest per MW (AC) Price shall be L-2 & so on subject to the successful bidder selected after E-RA .

iv. The Total Evaluated Bid Value shall be inclusive of Goods & Service Tax (GST) as quoted by the bidder. The award shall be placed Inclusive of GST with taxation bifurcation separately indicates as submitted by the successful bidder in the Schedule of Rates format.

v. Conditional discount, if offered, shall not be considered for evaluation.

vi. There will be separate LOA/contract agreements for Two different sites with the single successful bidder. Based on the per MW (AC) Price of L-1 bidder after e-RA, the site wise EPC and AMC Price will be calculated by multiplying the per MW (AC) Price with the respective site capacity quoted by bidder. Accordingly, 2 (Two) different EPC and AMC, Letter of Award (LOA) /Contract Agreement will be released for the respective site by the Purchaser to the single successful bidder only.

vii. After completion of online event of e-Reverse Auction, the successful bidder shall submit breakup of their final quoted price (post auction Total cost of ownership price) depicting all the price components within next 48 hours

through e-mail, so as to enable Purchaser to award the Letter of Award. Else, the final quoted price shall be reworked among various components in the Total cost of ownership (TCO) on pro-rata basis/ proportionately to all of the SOR Line items price quoted by the bidder initially in the financial bid except fixed loading(s), if any, by the purchaser. This proportionate price reduction will be applicable on all of the SOR line items, on which the e-RA has been actually conducted.

viii. **BILLING BREAK-UP (BBU):**

- For each item of SOR 1 to 5, the BBU shall be prepared in the same SOR format (Item name, UoM, Quantity, unit Ex Works price, GST, Total price etc) and the sum of all billing break-up item prices shall be equivalent to the each respective SOR's with discounted rate of e-Reverse auction (If applicable).
- No BBU items can be created at the BBU stage for the SOR line items which have been quoted by the contractor as Zero during the bidding stage.

- The Contractor would be required to provide detailed Bill of Quantity (BOQ) along with the breakup of Contract Price (including GST) and HSN code of the respective goods/services, which should match with the Price Quoted by the Contractor in its Price Bids after e-RA and accepted by the BBMB after detailed design and engineering and duly approved by Purchase. This will be used by the Purchaser at the time of payment to the Contractor. Accordingly, bidders should diligently quote the GST component in the bid.

- Purchaser shall reimburse the amount of GST as per the rates mentioned by Contractor in the detailed BOQ. In case of any statutory variation in GST during the currency of the Contract, same will be reimbursed to the Contractor subject to the statutory variation clause of the Bidding document, only in respect of the items/quantity which have been mentioned by the Contractor in the detailed BOQ.

- If there is difference in HSN/SAC classification and corresponding rate of GST of an item as confirmed/deemed confirmed by the bidder in its bid/detailed BOQ and HSN/SAC and corresponding rate of GST as interpreted under any interpretation/ judgment/ Notification/ Circular issued

under the GST law before the award of contract, GST reimbursable to the bidder/Bidder shall be lower of the GST applicable at the rate as confirmed/deemed confirmed in the bid or actual GST paid/payable by the bidder for that item.

- In case of imported Equipment/items purchased from third party (Bought-Out Items) are supplied to the BBMB in execution of the Project, the price of such Goods shall be inclusive of all cost as well as any duties paid/payable in relation to import/purchase of such goods (viz., customs duties, GST & levies etc.) considering and taking into account the ITC as may be available under the applicable laws including GST.

- In case of any statutory variation in GST during the currency of the Contract, same will be reimbursed to the Contractor only in respect of the taxes which are levied during the direct transaction held between BBMB and the Bidder. Any statutory variation applicable in respect of the items/services procurement between third party/sub-contractor and the bidder would not be reimbursed by BBMB. The successful bidder will be required to provide the detailed Billing break up (BBU) with GST in line with Schedule of Rates.

- Schedule of Rates is the Schedule and Breakup of Lump sum Price (Supply, Mandatory spares, Services, and Annual Maintenance) for quoted cumulative capacity by bidder but minimum11.5 MW (AC).

NOTE:- Price of AMC for evaluation of Bid shall be considered for Ten (10) years as per Schedule of Rates for AMC (SOR-3). However, initially AMC shall be placed for 5 years from date of Operational Acceptance and extendable for another five years at the sole discretionary of BBMB, as per the scope, terms and conditions given in the Tender documents and rates as per Schedule of Rates for AMC (SOR-3).

32.5 PROCEDURE FOR E- REVERSE AUCTION (E-RA)

i. The e-auctioning shall be conducted on https://eproc.punjab.gov.in portal on the day as intimated by BBMB to the eligible bidders.

ii. E -Reverse Auction will be carried out in current NIT under the framework of

BBMB rules after opening of price bid. Bidders who are technically qualified and submit the undertaking to BBMB can participate in e-Reverse Auction for which NIT is floated. Participation in e-Reverse Auction is mandatory for all eligible bidders. Any bidder not willing to submit such an undertaking shall be disqualified for further participation in respect of procurements in current NIT. The terms and conditions of e-Reverse auction is given at Annexure-21 and bidders are to submit undertaking as per Annexure 21 A.

iii. E-RA shall be carried out per MW (AC) Price basis based upon the cumulative capacity quoted by bidder but minimum cumulative capacity 11.5MW(AC) {Per MW (AC) Price shall be calculated by Grand Total Price of SOR – 1 to 3 divided by quoted cumulative capacity by bidder, but minimum 11.5 MW (AC)}.

iv. After completion of online event of e-Reverse Auction, the successful bidder shall submit breakup of their final quoted price (post auction Total cost of ownership price) depicting all the price components within next 48 hours through e-mail, so as to enable Purchaser to award the Letter of Award. Else, the final quoted price shall be reworked among various components in the Total cost of ownership (TCO) on pro-rata basis/ proportionately to all of the SOR Line items price quoted by the bidder initially in the financial bid except fixed loading(s), if any, by the purchaser. This proportionate price reduction will be applicable on all of the SOR line items, on which the e-RA has been actually conducted

33 COMPENSATION FOR EXTENDED STAY

NOT APPLICABLE

34 PURCHASE PREFERENCE

NOT APPLICABLE

[F] – LETTER OF AWARD/ CONTRACT AGREEMENT

35 NEGOTIATION AND AWARD OF CONTRACT

NEGOTIATION

In the opinion of BBMB, if the total price or certain item rates quoted by the Lowest Bidder are considered high, BBMB may invite the Lowest Bidder for price negotiation. Lowest Bidder shall attend such negotiation meetings and if requested by BBMB, bidder shall provide the analysis of rates/ break-up of amount quoted by him for any or all items of Schedule of Rates to demonstrate the reasonability.

AWARD OF CONTRACT

Subject to "ITB: Clause-29", The purchaser will award the contract to the successful bidder, whose bid has been determined to be substantially responsive and has been determined as the lowest evaluated bid, provided further that the bidder is determined to be qualified to perform the contract satisfactorily. The purchaser shall be the sole judge in this regard.

36 LETTER OF AWARD

There will be separate LOA/contract agreements for Two different sites with the single successful bidder. The Total Price of EPC (supply, service and mandatory spares) and AMC, will be converted into per MW (AC) Price. Based on the per MW (AC) Price of L-1 bidder after e-RA, the site wise EPC and AMC Price will be calculated by multiplying the per MW (AC) Price with the respective site capacity quoted by bidder. Accordingly, 2 (Two) different EPC and AMC, Letter of Award (LOA) /Contract Agreement will be released for the respective site by the Purchaser to the single successful bidder only

36.1 Prior to the expiration of the period of bid validity and extended validity period, if any, the purchaser will notify the successful bidder in writing by registered letter or by email, to be confirmed in writing by registered letter, that its bid has been accepted. The Letter of award will constitute the formation of the contract.

36.2 Contract Period shall commence from the date of "Letter of Award or as mentioned in the Letter of Award. The "Letter of Award" will constitute the formation of a Contract, until the Contract has been affected pursuant to signing of Contract as per "ITB: Clause-37".

36.3 “Letter of Award (LOA) shall be issued to successful bidder in duplicate. The

successful bidder is required to return its duplicate copy duly signed and stamped on each page including all the Annexures as a token of acknowledgement within 07 (Seven) days from the date of its issuance including all the Annexures as a token of acceptance.

36.4 In case the successful bidder fails to acknowledge the acceptance of “Letter of Award (LOA)" as mentioned above vide clause no. 36.3, same will be treated as a case of non-responsiveness & default and BBMB may take suitable action to get the project successfully executed. Same may constitute sufficient grounds for the forfeiture of EMD, if applicable may annul the entire Tendering process at its sole discretion.

36.5 In case of Non-responsive / Non acceptance to the Letter of Award or Conditional Acceptance or non-submission of timely Performance Security by the successful bidder, BBMB at its sole discretion may take appropriate actions with the forfeiture of EMD, if applicable & may annul the entire Tendering process at its sole discretion.

37 SIGNING OF CONTRACT AGREEMENT

37.1 The successful Bidder/ Contractor shall be required to execute the 'Contract Agreement' with purchaser on a 'non-judicial stamp paper' of appropriate value [cost of the 'stamp-paper' shall be borne by the successful Bidder/ Contractor] and of 'Chandigarh' specified in Bidding Data Sheet (BDS) only, within '30 [Thirty] days' of issuance of the "Letter of Award (LOA)”. The value of stamp paper will be INR 100/-.

37.2 In case the successful bidder fails to execute the ‘Contract Agreement’ as mentioned above vide clause no. 37.1 same will be treated as a case of non-responsiveness & default and BBMB may take suitable action to get the project successfully executed. Same may constitute sufficient grounds for the forfeiture of EMD, if applicable.

37.3 In case of Non-responsive/Non acceptance to the Letter of Award or Conditional Acceptance or non-submission of timely Performance Security by the successful bidder, BBMB at its sole discretion may take appropriate actions with the

forfeiture of EMD, if applicable & may annul the entire Tendering process at its sole discretion.

38 INTEGRITY PACT

BBMB has adopted the Integrity Pact to promote integrity, transparency and competitiveness in BBMB work. To implement the said Integrity Pact Programme, BBMB has appointed IEMs (Independent External Monitors). The name, address & contact details of IEMs are as under:

i) Mrs. Manisha Nanda, IAS (retd.)
Tower-5, D-2 (second floor),
New Motibagh GPRA colony,
Near Leela Palace Hotel,
New Delhi-110023
M.No. +91 9418500018
Email : nanda_manisha@yahoo.com

ii) Sh. S.Ravi, IRS (retd.)
H.No. 49 (New No. 6), V.V. Koil Street,
Chinmaya Nagar Stage-1,
Chennai -600092
M.No. +91 9444143642
Email id- sudhaandravi@gmail.com

For the implementation of Integrity Pact an agreement between the Principal (BBMB, the purchaser) and bidder/contractor (as per Annexure-19) is necessary in case of procurement of works/goods/services. The soft copy of agreement along with relevant annexure has been uploaded with the tender documents. The bidders are required to submit the said agreement on a stamp paper of the value of Rs. 15/- only and duly attested by the competent attesting authority to make it a legal document. Tenders not accompanied by the said agreement on behalf of bidder shall not be considered and shall lead to outright rejection. In case of any complaint regarding tendering, the bidder may contact any one of the above IEMs. Following clauses shall make part of the contract: -

i) If the bidder has been disqualified from the tender process prior to the award

of contract according to the provisions of the integrity pact, BBMB shall be entitled to demand and recover from the bidder liquidated damages amount by forfeiting the EMD/bid security (Bid Bond) as per provisions of the integrity pact.

ii) If the contract has been terminated according to the provisions of the IP, or if BBMB is entitled to terminate the contract according to the provisions of IP, BBMB shall be entitled to demand and recover from the contractor/security deposit as per Integrated Pact.

39 INCOME TAX & CORPORATE TAX

39.1 Income tax deduction shall be made from all payments made to the contractor as per the rules and regulations in force and in accordance with the Income Tax Act prevailing from time to time.

39.2 Corporate Tax liability, if any, shall be to the contractor's account.

39.3 TDS under GST as may be applicable shall be deducted as per law of Government of India in vogue.

39.4 MENTIONING OF PAN NO. IN INVOICE/ BILL

As per CBDT Notification No. 95/2015 dated 30.12.2015, mentioning of PAN no. is mandatory for procurement of goods/ services/ works/ consultancy services exceeding INR 2 Lacs per transaction.

Accordingly, Bidder/ contractor/ service provider/ consultant should mention their PAN no. in their invoice/ bill for any transaction exceeding INR 2 Lacs. As provided in the notification, in case Bidder/ contractor/ service provider/ consultant do not have PAN no., they have to submit declaration in Form 60 along with invoice/ bill for each transaction.

Payment of Bidder/ contractor / service provider/ consultant shall be processed only after fulfilment of above requirement.

40 SETTLEMENT OF DISPUTES

40.1 Any dispute (s) or difference (s) arising out of or in connection with the Contract shall, to the extent possible, be settled amicably between the parties.

40.2 If any dispute or difference of any kind whatsoever shall arise between the Purchaser and the contractor, arising out of the Contract for the performance of the works whether during the progress for the works or after its completion or whether before or after the termination, abandonment or breach of the Contract, it shall, in the first place, be referred to and settled by the Site-in-charge, who, within a period of thirty (30) days after being requested by either party to do so, shall give written notice of his decision to the Contractor.

40.3 Unless as hereinafter provided, such decision in respect of any matter so referred shall be final and binding upon the parties until the completion of the works and shall forthwith be given effect to by the Contractor who shall proceed with the works with all due diligence, whether he or the Purchaser requires arbitration as hereinafter provided or not.

40.4 If after the Site-in-charge has given written notice of his decision to the parties, no claim to arbitration has been communicated to him by either party within thirty (30) days from the receipt of such notice, the said decision shall become final and binding on the parties.

40.5 In the event of the Site-in-charge failing to notify his decision as aforesaid within thirty (30) days after being requested aforesaid, or in the event of either the owner or the Contractor being dissatisfied with any such decision, or within thirty (30) days after the expiry of the first mentioned period of thirty (30) days, as the case may be, either party may require that the matters in dispute be referred to arbitration as hereinafter provided.

41 ARBITRATION

41.1 All disputes or differences in respect of which the decision, if any, of the site-In-Charge has not become final or binding as aforesaid shall be settled by arbitration in the manner herein after provided.

41.2 If at any time question, dispute or difference whatsoever, shall arise between the Purchaser and the Supplier, upon or in relation to or in connection with the Contract either party may forthwith give to the other, notice in writing of the existence of such question, dispute or difference and the same shall be referred to award of an arbitral tribunal, whose decision shall be final and binding on the parties and the

provisions of The Arbitration and Conciliation Act, 1996 and of the rules thereunder and any statutory amendment/modification of reenactment thereof, for the time being in-force, shall be deemed to apply to and be incorporated in the contract. Arbitral Tribunal shall comprise 'N' No. of Arbitrators where 'N' shall be an odd number. (N-1)/2 No. of Arbitrator shall be appointed by the Supplier and Purchaser each and the remaining 1(one) No. Arbitrator shall be appointed by the aforementioned N-1 Arbitrators who shall act as the Presiding Arbitrator. In case N=1, the sole Arbitrator will be appointed with mutual consent of Supplier and the Purchaser. The arbitration proceedings shall be conducted at a place suitable to the Purchaser.

41.3 Such a notice of the existence of any question, dispute or difference in connection with contract shall be served by either party within 180 days or the issue of receipt by the consignee for each consignment failing which all rights and claims under this contract shall be deemed to have been forfeited and absolutely barred.

41.4 In case the order is placed on any Central Govt. Department or CPSU, settlement of disputes will be effected as per Deptt. of Public Enterprises, Ministry of Heavy Industries & Public Enterprises, GOI, OM No. F No. 4(1)/2013-DPE (PMA)/FTS-1835 dated 11.04.2017. In case of the orders placed on any State Govt. Deptt. or State Govt. Public Enterprise, dispute can be settled through Arbitration as per above mentioned OM dated 11.04.2017 as per mutual agreement between BBMB and that State Govt. Deptt. /Public Enterprise.

41.5 The work under the contract shall, if reasonably possible, continue during the arbitration proceedings and no payment due or payable by the purchaser shall be withheld on account of such proceedings.

41.6 During settlement of disputes and arbitration proceedings, both parties shall be obliged to carry out their respective obligations under the contract.

42 POWER OF ATTORNEY

42.1 The bidders shall be required to submit the Power of Attorney (POA), in original, in addition to submission of a copy in e-procurement portal along with the e-Bid, in the name of authorized signatory signing the Bid on behalf of the bidder's

company / firm and subsequent submissions on behalf of the Bidder. However, in case of General Power of Attorney, photocopy duly notarized / signed by any Functional Director in the Board of Directors is also acceptable. Non submission of POA in Original shall lead to rejection of the e-Bid (Annexure - 15).

42.2 The cancellation of any document such as Power of Attorney, Partnership Deed, etc. should be promptly communicated by the Bidder to the Purchaser in writing well in time, failing which Purchaser shall have no responsibility or liability for any action taken by Purchaser on the strength of the said documents.

43 RESTRICTIONS ON PROCUREMENT FROM A BIDDER OF A COUNTRY WHICH SHARES A LAND BORDER WITH INDIA

Any Bidder from a country which shares a land border with India will be eligible to bid in this tender only if bidder is registered with the Competent Authority which is the Registration Committee constituted by the Department for Promotion of Industry & Internal Trade (DPIIT) in line with the MoF OM No 6/18/2019-PPD dated 23.07.2020.

Further the successful bidder shall not be allowed to subcontract supplies/services/works to any “Sub-contractor” under “Service Part”, from a country which shares a land border with India unless such Subcontractor is registered with the competent as mentioned above.

The Contractor shall not be allowed to sub-contract works to any sub-contractor/ sub-vendor from a country which shares a land border with India unless such sub-contractor is registered with the competent Authority. However, the same shall not be applicable for “Supply Part”.

However, the said requirement of registration will not apply to bidders/sub-contractors from those countries (even if sharing a land border with India) to which the Government of India has extended lines of credit or in which the Government of India is engaged in development projects. Bidders may apprise themselves of the updated lists of such countries available in the website of the Ministry of External Affairs.

SECTION - III

BID DATA SHEETS (BDS)

ANNEXURE TO BID DATA SHEET (BDS) QUALIFYING REQUIREMENTS

QUALIFYING REQUIREMENTS (QR)

Eligibility conditions set forth in the tender document are as per minimum 11.5 MW (AC) cumulative capacity basis only. Bidders are required to quote accordingly for the complete cumulative capacity of minimum 11.5 MW (AC) on Lumpsum Turnkey (LSTK). However, bidders can quote cumulative capacity higher than 11.5MW (AC), based upon site survey by them prior to bid submission (minimum 10MW (AC) or higher capacity at 400kV substation, BBMB Bhiwani and minimum 1.5MW (AC) or higher capacity at 220kV substation, BBMB Hisar)

Qualification of the bidder(s) will be based on meeting the minimum eligibility criteria specified below regarding the Bidder's General Eligibility, Technical Experience and Financial Position as demonstrated by the Bidder's responses in the corresponding Bid documents.

1.1 GENERAL ELIGIBILITY CRITERIA

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

ii. Bidders who have been banned/ de-listed/ black listed/ debarred from business by BBMB /BBMB Partner States (Punjab, Haryana, Himachal Pradesh, Rajasthan and Chandigarh) / Ministry of New & Renewable Energy (MNRE)/Government Department/PSU's shall be ineligible to bid.

iii. **Joint Venture & Consortium are not eligible for this tender**.

1.2 TECHNICAL ELIGIBILITY CRITERIA

1.2.1

Route-I

IA. The bidder should have experience in EPC execution of Ground mounted/Floating/Canal Top Solar Projects on Turnkey basis including Design, Supply , Installation and Commissioning of Grid connected Solar PV Power Plant of cumulative Capacity not less than 10 (Ten) MW in last seven Financial years as

on last date of bid submission. However, such Grid connected Solar PV Power Plant capacity must have been in satisfactory operation for at least Six (6) months prior to the last date of bid submission.

AND

IB. Out of the above, the bidder should have experience in EPC execution of Ground mounted/Floating/Canal Top Solar Projects on Turnkey basis including Design, supply, installation & commissioning of at least 01 (One) Grid connected Solar PV Power Plant Projects having an individual capacity of 3 (Three) MW or above in last seven Financial years as on last date of bid submission. However, such Grid connected Solar PV Power Plant capacity must have been in satisfactory operation for at least Six (6) months prior to the last date of bid submission.

OR

Route II

IIA. The bidder must have experience in execution of Ground mounted/Floating/Canal Top Solar Projects as a Developer of Grid-connected Solar PV Power Plant(s) of cumulative Capacity not less than 10 (Ten) MW (AC) in last seven Financial years as on last date of bid submission. However, such Grid connected Solar PV Power Plant capacity must have been in satisfactory operation for at least Six (6) months prior to the last date of bid submission.

AND

IIB. The bidder must have experience in execution of Ground mounted/Floating/Canal Top Solar Projects as a Developer of at least 01 (One) Grid connected Solar PV Power Plant Projects having an individual capacity of 3 (Three) MW (AC) or above in last seven Financial years and till last date of bid submission. However, such Grid connected Solar PV Power Plant capacity must have been in satisfactory operation for at least Six (6) months prior to the last date of bid submission.

1.2.2 DOCUMENTS IN SUPPORT OF TECHNICAL EXPERIENCE AND PERFORMANCE

BIDDER ARE REQUIRED TO SUBMIT:

a) The list of projects commissioned at least Six (6) months prior to the last date

of Bid Submission in last seven Financial year, indicating whether the project is grid connected, along with a scanned copy of the Commissioning certificate and Work order / Contract / Agreement/LOI from the Client (or Owner) shall be submitted in support of Clause 1.2 above.

The said certificate shall preferably indicate the following.

i. Full Name & Address of Client and Engineer-In-Charge/Officer.
ii. Reference to relevant work order.
iii. Date of actual completion.
iv. A certificate from the client stating that the work has been completed satisfactorily.

b) The Performance Certificate must have been issued for a minimum duration of Six (6) months from the date of commissioning in last seven Financial year.

The Performance Certificate/Joint meter reading (JMR) reports shall have been issued by any state/ central owned agencies or state power departments or authorized representative of Power offtaker (Discom/Private Power purchaser).

c) Bidder also to fill their technical experience as per (Annexure - 11).

1.3 FINANCIAL CRITERIA

The minimum average annual financial turnover during the last 3 year, ending 31st March/30th September/31st December (as applicable) for the previous financial year should be at least Rs **15Cr (Rs Fifteen Crores Only)**. Minimum Average Annual Turnover shall mean Revenue from Operations as incorporated in the profit & loss account excluding other income, e.g. sale of fixed assets. A summarized sheet of average turnover, certified by a practicing Chartered Accountant/Statutory Auditor should be compulsorily enclosed along with corresponding annual accounts

AND

Net Worth" of the Bidder shall be calculated as per Company Act 2013. The net worth for the last financial year should be **positive**.

AND

The prospective bidder should furnish requisite Audited Financial Results viz Profitability (Profit & Loss Account Statement), Net worth, Turnover, Balance sheet

duly certified by authorized Charted Accountant/equivalent certifying authority of last 3 consecutive accounting/financial years ending 31st March/30th September/31st December (as applicable) indicating that they have financial capability, established resources and working capital to meet the financial obligations pursuant to the execution of the contract taking into account other existing commitments and qualify the minimum requirements as above.

Bidder is to submit "Details of Financial capability of Bidder" as per (Annexure - 13) duly signed and stamped by a Chartered Accountant.

Note: - The definition of Net-Worth shall be as below:

"Net **worth**" means the aggregate value of the paid-up share capital and all reserves created out of the profits, securities premium account and debit or credit balance of profit and loss account, after deducting the aggregate value of the accumulated losses, deferred expenditure and miscellaneous expenditure not written off, as per the audited balance sheet, but does not include reserves created out of revaluation of assets, write-back of depreciation and amalgamation.

Sr. No.	**Description**	**As shown in Audited Financial Statement**	
		Figure (In Currency ___)	**Schedule Reference, Page no., Clause no.**
A	Paid up Share capital	XXXX	
B	Add: Share Application Money pending allotment	XXX	
C	Add: Reserves (As defined above)	XXXX	
D	Less: Accumulated Losses	XX	
E	Less: Deferred Revenue Expenditure to the extent not written off	XX	
F	Net Worth (A+B+C-D-E)	XXXX	

1.4 DOCUMENTS TO BE SUBMITTED BY BIDDER TOWARDS MEETING THE GENERAL ELIGIBILITY, TECHNICAL AND FINANCIAL CRITERIA AS ABOVE

BIDDERS RESPONSIBILITY:

It is bidder's prime responsibility to submit genuine and authentic documents. No amount of checking or verification by the Purchaser shall absolve bidder from his responsibility. Moreover, the bidder's organization is responsible for any and all actions of their employees and any claims seeking to pin point the blame on some employee of bidder and attempting to absolve the bidder's organization will not be entertained. Wherever Purchaser has concern or apprehensions regarding the authenticity/correctness of any document, Purchaser reserves the right to get the documents cross-verified from the document issuing authority.

Any additional documents other than what are specifically asked in various sections of the bidding document, if deemed necessary to establish the qualifying requirements may be submitted by the Bidder on their own.

NOTE:-

1. Failure to meet the above Qualification Criteria will render the Bid to be summarily rejected. Therefore, the Bidder shall in their own interest furnish complete documentary evidence in the first instance itself along with their bid, in support of their fulfilling the Qualification Criteria as mentioned above and other techno-commercial requirements as per bidding document modified to the extent of Amendments, if any.
2. Bidder to give a declaration regarding their existing Litigation/Arbitration, if any. However, submission of these existing litigation details may not be a reason for disqualification. In case, if declaration is not submitted, the bid will be rejected as non-responsive.
3. In case of Litigation/Arbitration, bidder to confirm that the current Litigation/ Arbitration, in which bidder is involved will not have any impact in work being tendered or in entering into contract during the validity of offer and performing the contract till all the contractual obligations under contract are performed.
4. The Bidder shall submit a self-attested undertaking on the letter head by the person holding power of attorney of the Bidder as per the format (Annexure - 20)

SECTION - IV

GENERAL CONDITIONS OF CONTRACT (GCC)

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Preamble

This Section (Section - IV) of the Bidding Documents [named as General Conditions of Contract (GCC)] provides the performance of the Contractor, payments under the contract or matters affecting the risks, rights and obligations of the parties under the contract. This Section contains provisions that are to be used unchanged unless Section - V [named as Special Conditions of Contract (SCC)] states otherwise as any changes in GCC or any complementary information that may be needed has been shown in SCC. If there is a conflict between the provisions of Section - IV & Section - V, the provisions of Section - V shall prevail.

Bidders may note that the respective rights of the BBMB and Bidders/ Contractors shall be governed by the Tender Documents/ Contracts signed between the BBMB and the Contractor. The provisions of Tender Documents shall always prevail over any other documents in case of contradiction.

Further in all matters arising out of the provisions of this Section - IV and the Section - V of the Tender Documents, the laws of the Union of India shall be the governing lawsand courts of CHANDIGARH shall have exclusive jurisdiction.

[A] DEFINITIONS

1. Definition of Terms:

1.1 In this **TENDER** (as here-in-after defined) the following words and expressions shall have the Meanings hereby assigned to them except where the context otherwise required.

1.1.1 **ADJUDICATOR** means the person or persons named as such in the tender to make a decision on or to settle any dispute or difference between the Purchaser and the Contractor.

1.1.2 **AFFILIATE** shall mean a company that either directly or indirectly

a) controls or

b) is controlled by or

c) is under common control with

"Control" means ownership, directly or indirectly, of more than 50% (fifty percent) of the voting shares of such Company or right to appoint majority Directors.

1.1.3 **AFFECTED PARTY** means Purchaser or the Contractor whose performance has been affected by an event of Force Majeure

1.1.4 **APPLICABLE LAW** means any statute, law, regulation, ordinance, notification, rule, regulation, judgment, order, decree, bye-law, approval, directive, guideline, policy, requirement or other governmental restriction or any similar form of decision of, or determination by, or any interpretation or administration having the force of law in the Republic of India and the State Government, by any Government Authority or instrumentality thereof, whether in effect as of the date of this Contract or thereafter**.**

1.1.5 **APPROVED** shall mean approved in writing including subsequent written confirmation of previous verbal approval and "APPROVAL" means approval in writing including as aforesaid.

1.1.6 **APPOINTING AUTHORITY** for the purpose of arbitration shall be the any person so designated bythe Purchaser.

1.1.7 **ARBITRATOR** means the person or persons appointed by agreement between the Purchaser and the Contractor to make a decision on or to settle any dispute or difference between the Purchaser and the contractor referred to him or her by the parties.

1.1.8 **B.I.S.** means specifications of Bureau of Indian Standards (BIS).

1.1.9 **BID** means the Techno Commercial and Price Bid submitted by the Bidder along with all documents/ credentials/ attachments/ annexure etc., in response to the Tender, in accordance with the terms and conditions hereof.

1.1.10 **BIDDER** means Bidding Company submitting the Bid. Any reference to the Bidder includes Bidding Company including its successors, executors and permitted assigns as the context may require.

1.1.11 **CEA** means the Central Electricity Authority.

1.1.12 **CHARTERED ACCOUNTANT** means a person practicing in India or a firm whereof all the partners practicing in India as a Chartered Accountant(s) within the meaning of the Chartered Accountants Act, 1949.

1.1.13 **COLLABORATOR** or **PARENT COMPANY** means the firms/ corporations who has provided technological support to the manufacturer for establishing production line for the specific Equipment.

1.1.14 **COMPANY** means a body incorporated in India under the Companies Act, 1956 or Companies Act,2013 including any amendment thereto.

1.1.15 **CONTRACT** shall mean the Agreement between the Purchaser and the Contractor for the execution of the works including therein all Contract documents.

1.1.16 CONTRACTOR means the person or the persons, Company or Corporation whose Tender has been accepted by the Purchaser and includes the Contractor's legal representatives his/ hersuccessors and permitted assigns.

1.1.17 CONTRACT DOCUMENTS mean collectively the Tender Documents, Designs, Drawings, Specification, Schedule of Quantities and Rates, Letter of Award/ Letter of Intent and agreed variations if any, and such other documents constituting the Tender and acceptance thereof.

1.1.18 CONTRACTOR'S EQUIPMENT means all plant, facilities, equipment, machinery, tools, apparatus, appliances or things of every kind required in or for installation, completion and maintenance of Facilities that are to be provided by the Contractor, but does not include Plant and Equipment, or other things intended to form or forming part of the Facilities.

1.1.19 CONTRACTOR'S REPRESENTATIVE means any person nominated by the Contractor and approved by the Purchaser to perform the duties delegated by the Contractor.

1.1.20 CONSULTANT means Techno-Commercial experts who are the consulting engineer to the Purchaser /Contractor for this project.

1.1.21 COMMISSIONING means a project shall be considered commissioned if all equipment as per rated capacity, mentioned under the scope of contract, has been installed and energy has flown into grid.

1.1.22 COMPLETION OF FACILITIES means that the Facilities have been completed in whole **operationally and structurally** and put in a tight and clean condition, and that all work in respect of Pre-commissioning of the Facilities has been completed; and Commissioning has been attained as per Technical Specifications.

1.1.23 CHANGE ORDER means an order given in writing by the Site-In-Charge to effect additions to or deletion from and alteration in the works.

1.1.24 DAY means a day of 24 hours from midnight to midnight irrespective of the number of hours worked in that day.

1.1.25 Delivery Point" shall be the interconnection point at which bidder shall deliver the power to the BBMB substation system. The metering shall be done at this point of interconnection.

1.1.26 DEFECT LIABILITY PERIOD

1.1.27 in relation to scope of work means 12 (Twelve) months from the date of Operational acceptance during which the Contractor stands responsible for rectifying all defects/ rejection that may appear in the works executed by the Contractor in pursuance of the Contract and includes warranties against Manufacturing/ Fabrication/ Erection/ Construction defects covering all materials plants, equipment, components and the like supplied by the Contractor, works executed against workmanship defects.

1.1.28 DRAWINGS shall include maps, plans and tracings, supporting documents, specifications or prints or sketches thereof with any modifications approved in writing by the Site-in-Charge and such other drawing as may, from time to time, be furnished by the contractor.

1.1.29 EARNEST MONEY DEPOSIT (EMD) means the unconditional and irrevocable Tender Security in the form of Demand Draft/ Bank Guarantee to be submitted along with the Bid by the Bidder as prescribed in the Tender document.

1.1.30 EMPLOYER means the BBMB, named in the **BDS/ SCC**, who is responsible for getting the Facilities implemented from the contractor.

1.1.31 SITE-IN-CHARGE shall mean the person designated from time to time by the BBMB and authorized to coordinate with contractor regarding execution of

Project at site as per NIT.

1.1.32 EFFECTIVE DATE/ZERO DATE means the date of issuance of Letter of Award (LOA) from which the Time for Completion shall be determined or any other specific date as provided in the NIT.

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

1.1.34 FINAL ACCEPTANCE/FINAL COMPLETION means acceptance of Facilities by the Purchaser at the end of one year from the date of Operational Acceptance and upon demonstration of minimum annual parameters as specified in the technical specifications and completion of works under the punch list which certifies the Contractor's fulfilment of the Contract in respect of Functional and Plant Performance Guarantees of the Facilities.

1.1.35 GUARANTEE TEST(S) means the test(s) specified in the Technical Specifications to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees specified in the Technical Specifications during/ after successful Commissioning followed by Trial - Operation.

1.1.36 IEC means specifications of International Electro-Technical Commission.

1.1.37 INSTALLATION SERVICES means all those services ancillary to the supply of the Plant and Equipment for the Facilities, to be provided by the Contractor under the Contract; e.g., transportation and provision of marine or other similar insurance (s), inspection, expediting, site preparation works (including the provision and use of Contractor's Equipment and the supply of all structural and construction materials required), installation including civil and allied works etc., testing, pre- commissioning, commissioning, operations, maintenance, the provision of operations and maintenance manuals, training of Purchaser

Personnel's etc..

1.1.38 MWp means Mega-Watt Peak.

1.1.39 kWh shall mean Kilo-Watt-hour.

1.1.40 LANGUAGE FOR DRAWINGS AND INSTRUCTION All the drawings, titles, notes, instruction, dimensions, etc. shall be in English Language only.

1.1.41 MNRE means Ministry of New and Renewable Energy, Government of India.

1.1.42 MOBILIZATION shall mean establishment of sufficiently adequate infrastructure by the Contractor at Site comprising of construction equipment, aids, tools tackles including setting of site offices with facilities such as power, water, communication etc. establishing manpower organization comprising of Resident Engineers, Supervising Personnel and an adequate strength of skilled, semi-skilled and un-skilled workers, who with the so established infrastructure shall be in a position to commence execution of work at site(s), in accordance with the agreed Time Schedule of Completion of Work. Mobilization shall be considered to have been achieved, if the Contractor is able to establish infrastructure as per Time Schedule, where so warranted in accordance with agreed schedule of work implementation to the satisfaction of Site-in-Charge.

1.1.43 NET-WORTH shall have same meaning as defined in Company Act 2013 and Amendment, if any.

1.1.44 NOTICE IN WRITING OR WRITTEN NOTICE shall mean a notice in written, typed or printed characters sent (unless delivered personally or otherwise proved to have been received by the addressee) by registered post to the latest known private or business address or registered office of the addressee and shall be deemed to have been received in the ordinary course of post it would have been delivered.

1.1.45 Letter of Award (LOA) means the official notice issued vide Letter/ E-mail by

the Purchaser notifying the Contractor that his bid has been awarded.

1.1.46 OPERATIONAL ACCEPTANCE means the acceptance of all the Plant Facilities by the Purchaser/Site-in-Charge, which certifies the Contractor's fulfilment of the Contract in respect of meeting Plant Functional and Performance Guarantees of the Facilities and completion of works.

1.1.47 AMC means Annual Maintenance of Commissioned Project/ Work/ Facilities under the contract.

1.1.48 PURCHASER/OWNER means BBMB.

1.1.49 PARENT COMPANY means a company that holds more than Fifty Percent (50%) of the paid-up equity capital directly or indirectly in the Bidding Company as the case may be.

1.1.50 PLANT AND EQUIPMENT means permanent plant, equipment, machinery, apparatus, articles and things of all kinds to be provided and incorporated in the Facilities by the Contractor under the Contract (including the spare parts to be supplied by the Contractor) but does not include Contractor's Equipment.

1.1.51 PLANT FACILITY(IES)/ FACILITY(IES) means the Plant and Equipment to be supplied and installed, as well as all the Installation Services to be carried out by the Contractor under the Contract.

1.1.52 PRE-COMMISSIONING means the testing, checking and other requirements specified in the Technical Specifications that are to be carried out by the Contractor in preparation for Commissioning.

1.1.53 SCC means the Special Conditions of Contract.

1.1.54 BBMB means Bhakra Beas Management Board.

1.1.55 SITE means the land and other places upon which the Facilities are to be installed, and such other land or places as specified in the SCC of the Contract as forming part of the Site.

1.1.56 SPECIFICATION shall mean all directions the various Technical Specifications, provisions attached and referred to the Tender Documents which pertain to the method and manner of performing the work or works to the quantities and qualities of the work or works and the materials to be furnished under the Contract for the work or works, as may be amplified or modified by the Purchaser or Site-in-Charge during the performance of Contract in order to provide the unforeseen conditions or in the best interests of the work or works. It shall also include the latest edition of relevant Standard Specifications including all addenda/ corrigenda published before entering into Contract.

1.1.57 SUB-CONTRACTOR including vendors, means any person to whom execution of any part of the Facilities, including preparation of any design or supply of any Plant and Equipment, is sub- contracted directly or indirectly by the Contractor, and includes its legal successors or permitted assigns.

1.1.58 TEMPORARY WORKS shall mean all temporary works of every kind required in or about the execution, completion or maintenance of site works.

1.1.59 TENDER/TENDER DOCUMENTS/ BIDDING DOCUMENTS means the entire set of documents vide which Purchaser invite bids for Projects/ Works/ Facilities that are submitted within a finite deadline by the Bidder/ Contractor.

1.1.60 TIME FOR COMPLETION/CONTRACTUAL COMPLETION TIME means the time within which **Completion of the Facilities is** to be attained in accordance with the specifications, as a whole of the Facilities as specified in the SCC of the tender document

1.1.61 TOTAL CONTRACT PRICE/CONTRACT VALUE means the firm value of the final Lumpsum quoted price, as a result of e- RA (if applicable), by the successful bidder specified in its financial proposal as the sum of individual contract value of

Design, supply & installation works, Mandatory Spares including AMC (if applicable) against work as specified in the financial proposal, subject to such additions and adjustments there to or deductions there from, as may be made pursuant to the Contract including Goods & Service taxes (as specified in the ITB).

1.1.62 WEEK means a period of any consecutive seven days.

1.1.63 WORKING DAY means any day which is not declared to be holiday or rest day by the BBMB.

1.1.64 Synchronization means connection of Solar plant output to grid .

[B] GENERAL INFORMATIONS

2. GENERAL INFORMATION

2.1.1 LOCATION OF SITE

The proposed location of Project site(s) is/ are defined in the Scope of work under technical specifications & also defined under the Special conditions of contract (SCC).

2.1.2 ACCESS BY ROAD

Site are well accessed by Roads and Railways connectivity.

2.2 SCOPE OF WORK

The scope of work is defined in the Section - VII, Scope of Work and Technical Specifications (TS) of the Tender document. In addition, the Contractor shall provide all necessary materials, equipment, labour etc. for the execution and maintenance of the work till completion unless otherwise mentioned in the Tender Document.

2.3 CONSTRUCTION WATER SUPPLY

BBMB shall provide water required during construction and AMC activity to contractor from its source of supply. However from Purchaser source of water supply to solar project site all pumping installations, pipe network and

distribution system will have to be carried out by the Contractor at his own risk and cost.

2.4 CONSTRUCTION POWER SUPPLY

i. The Contractor shall arrange for the temporary Power Supply at the site for construction purpose at its own cost.

ii. Cost of electricity required during construction shall be payable by the Contractor. For construction, temporary connection from Distribution Company shall be arranged by the Contractor as per applicable tariff.

iii. It shall be the responsibility of the Contractor to provide and maintain the complete installation on the load side of the supply with due regard to safety requirement at site. All cabling, equipment, installations etc. shall comply in all respects with the latest statutory requirements and safety provisions i.e., as per the Central/ State Electricity Acts and Rules etc. The Contractor will ensure that his equipment and Electrical Wiring etc., are installed, modified, maintained by a licensed Electrician/ Supervisor.

2.5 LAND FOR CONTRACTOR'S FIELD OFFICE, GODOWN AND WORKSHOP

The Site-In-Charge will, at his own discretion and convenience and for the duration of the execution of the work make available near the site, land for construction of Contractor's Temporary Field Office, store, workshops and assembly yard required for the execution of the Contract. The Contractor shall at his own cost construct all these temporary buildings and provide suitable water supply and sanitary arrangement approved by the Site-in-Charge.

On completion of the works undertaken by the Contractor, he shall remove all temporary works erected by him and have the Site cleaned as directed by Site-in-Charge. If the Contractor shall fail to comply with these requirements, the Site-In-Charge may, at the expenses of the Contractor remove such surplus and rubbish materials and dispose of the same as he deems fit and get the site cleared as aforesaid; and Contractor shall forthwith pay the amount of all expenses so incurred and shall have no claim in respect of any such surplus materials disposed of as aforesaid. But the Site-In-Charge reserves the right to

ask the Contractor any time during the pendency of the Contract to vacate the land by giving 07 (Seven) day notice on security reasons or on national interest or otherwise.

The Contractor shall put up temporary structures as required by them for their office, fabrication shop and construction stores only in the area allocated to them on the project site by the Site-In-Charge. No tea stalls/ canteens should be put up or allowed to be put up by any Contractor in the allotted land or complex area without written permission of the Site-In-Charge.

All temporary buildings, sheds, workshops, field station etc. shall be constructed in conformation with the safety and security regulations of the ports as regards location and type of structure.

No unauthorized buildings, constructions or structures should be put up by the Contractor anywhere on the project site. For uninterrupted fabrication work, the Contractor shall put up temporary covered structures at his cost within Area in the location allocated to them in the project site by the Site-In-Charge. No person except for authorized watchman shall be allowed to stay in the plant area/ Contractor's area after completion of the day's job without prior written intimation to Site-In-Charge.

2.6 Land for Residential Accommodation

Contractor has to arrange the accommodation for their staff/labour. However, subject to availability, BBMB may provide land for temporary construction or quarters or guest house on chargeable basis, as per the BBMB rules. The BBMB shall not, however, guarantee the provision of land/accommodation.

[C] ADDITIONAL GENERAL INSTRUCTIONS TO BIDDERS

3. DOCUMENTS

3.1 CORRECTIONS AND ERASURES: All correction(s) and alteration(s) in the entries of Tender paper shall be signed in full by the bidder with date. No erasure or over writing is permissible.

3.2 WITNESS: Witness and sureties shall be persons of status and property and their names, occupation and address shall be stated below their signature.

3.3 DETAILS OF EXPERIENCE

The bidder should furnish, along with his Tender, details of previous experience in having successfully completed in the recent past works of this nature, together with the names of Purchaser, location of sites and value of Contract, date of commencement and completion of work, delays if any, reasons of delay and other details along with documentary evidence(s).

3.4 LIABILITY OF GOVERNMENT OF INDIA

It is expressly understood and agreed by and between bidder or/ Contractor and BBMB that, BBMB is entering into this agreement solely on its own behalf. In particular, it is expressly understood and agreed that the Government of India has no liabilities, obligations or rights hereunder. It is expressly understood and agreed that BBMB is an independent legal entity with power and authority to enter into Contracts solely on its own behalf under the applicable Laws of India and general principles of Contract Law.

It is further understood and agreed that the Government of India is not and shall not be liable for any acts, omissions, commissions, breaches or other wrongs arising out of the Contract. Accordingly, bidder/ Contractor hereby expressly waives, releases and foregoes any and all actions or claims, including cross claims, impleader claims or counter claims against the Government of India arising out of this Contract and covenants not to sue to Government of India as to any manner, claim, cause of action or thing whatsoever arising of or under this agreement.

4. TRANSFER OF TENDER DOCUMENTS

Transfer of Tender Documents purchased by one intending bidder to another is not permissible.

5. RIGHT OF PURCHASER TO ACCEPT OR REJECT TENDER

The right to accept the Tender will rest with the BBMB. The BBMB, however, does not bind himself to accept the lowest Tender, and reserves to itself the

authority to reject any or all the Tenders received without assigning any reason whatsoever.

The purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to award of contract without thereby incurring any liability to the affected bidder or bidders any obligation to inform the affected bidder or bidders on the grounds for the Purchaser's action.

Tenders in which any of the particulars and prescribed information are missing or are incomplete in any respect and/ or the prescribed conditions are not fulfilled are liable to be rejected. The Tender containing uncalled for remarks or any additional conditions are liable to be rejected. Canvassing in connection with Tenders is strictly prohibited and Tenders submitted by the Tenderers who resort to canvassing will be liable to rejection.

6. TIME SCHEDULE & PROGRESS REPORTING

i. The work shall be executed strictly as per the Time Schedule specified in Section - V, Special Conditions of Contract (SCC). The period of construction given in Time Schedule includes the time required for mobilization as well as testing, rectifications if any, retesting and completion in all respects to the entire satisfaction of the Site-in- Charge.

ii. A joint program of execution of the work will be prepared by the Contractor based on priority requirement of this project & submitted to the Site -in-charge. This program will take into account the time of completion mentioned above and the time allowed for the priority works by the Site- in-Charge.

iii. Monthly/ Weekly construction program will be drawn up by the Site-in-Charge jointly with the Contractor, based on availability of work fronts and the joint construction program as per above. The Contractor shall scrupulously adhere to these targets/ programs by deploying adequate personnel, construction tools and tackles and he shall also supply himself all materials of his scope of supply in good time to achieve the targets/ programs. In all matters concerning the extent of targets set out in the weekly and monthly programs and the degree of achievements the decision of the Site - in- Charge will be final and binding on the Contractor.

iv. The Contractor shall monitor progress of all the activities specified in the work schedule referred in GCC above and submit the progress report to the Site - in- Charge as per the Contract Co-ordination procedure.

v. If at any time the Contractor's actual progress falls behind the scheduled program, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Site - in- Charge, prepare and submit to the Site - in- Charge a revised program, taking into account the prevailing circumstances, and shall notify the Site - in- Charge, of the steps being taken to expedite progress so as to attain Completion of the Facilities within the Time for Completion. If any extension there of entitled under GCC Clause, or any extended period as may otherwise be agreed upon between the Purchaser/Site- in- Charge and the Contractor, Contractor shall submit the revised plan for completion of Facility accordingly.

vi. Maintenance of Records of Progress Review Meeting

The Contractor shall be required to attend all site progress review meetings organized by the 'Site - in- Charge or his authorized representative. The deliberations in the meetings shall inter-alia include the program, progress of work (including details of manpower, material, tools and plants deployed by the Contractor vis-à-vis agreed schedule), inputs to be provided by Site - in- Charge, delays, if any and recovery program, specific hindrances to work and work instructions by Site - in- Charge. The minutes of the meetings shall be recorded with the 'Site - in- Charge or his authorized representative.

7. CONFLICT OF INTEREST AND BIDDER'S RESPONSIBILITY

i. A bidder shall not have a Conflict of Interest. All bidders found to have Conflict of Interest shall be disqualified. A bidder may be considered to have a Conflict of Interest with one or more parties in this bidding process, if:

a) They have a controlling partner in common; or

b) They receive or have received any direct or indirect subsidy from any of them; or

c) They have the same legal representative for the purposes of this bid; or

d) They have a relationship with each other, directly or through common

third parties, that puts them in a position to have access to information about or influence on the bid of another bidder, or influence the decision of the BBMB regarding this bidding process; or

e) A bidder submits more than one bid in this bidding process, either individually [including bid submitted as an agent/ authorized representative on behalf of one or more bidders or through license - licensor route, wherever permitted as per the provision of the Qualification Requirement for the bidders in the Annexure to Bid Data Sheet (BDS)], except for alternative offers permitted under Tender. This will result in the disqualification of all such bids; or

ii. The intending bidder shall be deemed to have visited the Site and familiarized submitting the Tender. Non-familiarity with the site conditions will not be considered a reason either for extra claims or for not carrying out the works in strict conformity with the Drawings and Specifications or for any delay in performance.

8. RETIRED GOVERNMENT OR COMPANY OFFICERS

No Engineer of Gazetted rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the States/ Central Government or of the BBMB is allowed to work as a Contractor for a period of two years after his retirement from Government Service, or from the employment of the BBMB. The Contract, if awarded, is liable to be cancelled if either the Contractor or any of his employees is found at any time to be such a person, who has not obtained the permission of the State/ Central Government before submission of Tender, or engagement in the Contractor's service as the case may be.

9. REPRESENTATIVES AND FIELD MANAGEMENT & CONTROLLING

i. **SITE -IN-CHARGE**

If the Site-In-Charge is not named in the Contract, then within seven (7) days of the Effective Date, the Purchaser shall notify the Contractor in writing of the name of the Site-In-Charge. The Purchaser may from time to time appoint some other person as the Site-In-Charge in place of the person

previously so appointed and shall give a notice of the name of such other person to the Contractor without delay. The Site-In-Charge shall represent and act for the Purchaser at all times during the currency of the Contract.

All notices, instructions, information and other communications given by the Contractor to the Purchaser under the Contract shall be given to the Purchaser or Site-In-Charge, except as herein otherwise provided.

ii. **CONTRACTOR'S REPRESENTATIVE & CONSTRUCTION MANAGER**
If the Contractor's Representative is not named in the Contract, then within seven (07) days of the Effective Date, the Contractor shall appoint the Contractor's Representative and shall request the Purchaser or Site-In-Charge in writing. If the Purchaser or Site-In-Charge objects to the appointment within seven (07) days giving the reason therefor, then the Contractor shall appoint a replacement within seven (07) days of such objection, and the foregoing provisions of this GCC clause shall apply thereto.

iii. The Contractor's Representative shall represent and act for the Contractor at all times during the tenure of the Contract and shall give to the Site-In-Charge all the Contractor's notices, instructions, information and all other communications under the Contract.

iv. All notices, instructions, information and all other communications given by the Purchaser or Site-In-Charge to the Contractor under the Contract shall be given to the Contractor or Contractor's Representative or, in its absence, its deputy, except as herein otherwise provided.

v. The Contractor shall not revoke the appointment of the Contractor's Representative without the site-in-charge consent, which shall not be unreasonably withheld. If the site-in-charge consents thereto, the contractor shall appoint some other person as the Contractor's Representative, pursuant to the procedure set out in GCC Clauses.

vi. The Contractor's Representative may, subject to the approval of the Purchaser/ site-in-charge (which shall not be unreasonably withheld), at any

time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice and shall specify the powers, functions and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Site-In-Charge.

vii. Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with this GCC Clause shall be deemed to be an act or exercise by the Contractor's Representative.

viii. Notwithstanding anything stated in GCC Clause above, for the purpose of execution of contract, the Purchaser/ site-in-charge and the Contractor shall finalize and agree to a Contract Co-ordination Procedure and all the communication under the Contract shall be in accordance with such Contract Co-ordination Procedure.

ix. From the commencement of installation of the Facilities at the Site until Final Acceptance, the Contractor's Representative shall appoint a suitable person as the construction manager (hereinafter referred to as "the Construction Manager"). The Construction Manager shall supervise all work done at the Site by the Contractor and shall be present at the Site throughout normal working hours except when on leave, sick or absent for reasons connected with the proper Performance of the Contract. Whenever the Construction Manager is absent from the Site, a suitable person shall be appointed to act as his or her deputy.

x. The Site-In-Charge may object to any contractor's representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Site-In-Charge, may behave inappropriately, may be in- competent or negligent, or may commit a serious breach of the Site regulations and safety.

xi. If any representative or person employed by the Contractor is removed in accordance with GCC Clause above, the Contractor shall, where required, promptly appoint a replacement. The Site-In-Charge may also authorize his representatives to assist in performing his duties and functions.

xii. **Hindrance Register**

The Contractor may also maintain a Hindrance Register where reasons along with documentary evidence for delay/ fault may be recorded from time to time and at the time of occurrence of the hindrance and get it duly certified by the Site-In-Charge or his authorized representative.

10. NOTE TO SCHEDULE OF RATES

i. The Schedule of Rates should be read in conjunction with Section - VIII of the Tender documents.

ii. The bidder shall be deemed to have studied the Drawings (if any), Specifications and details of work to be done within Time Schedule and to have acquainted himself of the condition prevailing at site.

iii. Rates must be filled in the Schedule of Rates of original Tender Documents.

11. POLICY FOR TENDERS UNDER CONSIDERATION

11.1 Only Those Tenders which are complete in all respects and are strictly in accordance with the Terms and Conditions and Technical Specifications of Tender Document, shall be considered for evaluation. Such Tenders shall be deemed to be under consideration immediately after opening of Tender and until such time an official intimation of acceptance/ rejection of Tender is made by Purchaser to the Bidder.

11.2 Zero Deviation: Bidders to note that this is a Zero Deviation Tender. Purchaser will appreciate submission of bids based on the terms and conditions in the enclosed General Conditions of Contract (GCC), Special Conditions of Contract (SCC), Instructions to Bidders (ITB), Scope of Work, technical specifications etc. to avoid wastage of time and money in seeking clarifications on technical/ commercial aspects of the bids. Bidder may note that no technical and commercial clarifications will be sought for after the receipt of the bids. In case of any deviation/ nonconformity observed in the bid, it will be liable for rejection.

12. CLARIFICATION OF TENDER DOCUMENT

Verbal clarification and information given by Employer or its representatives shall not in any way be binding on Purchaser.

13. LOCAL CONDITIONS

i. The site is being offered to the bidders for Project on "**as is where is**" basis assuming that bidders have acquainted themselves appropriately with all the local site conditions & no plea will be entertained before/after the award of contract on this ground. It will be imperative on each bidder to inform himself of all local site conditions and factors which may have any effect on the execution of work covered under the Tender Document. In their own interest, the bidder(s) is/ are requested to familiarize themselves with the Indian Income Tax Act 1961, Indian Companies Act 1956 & 2013, and Indian Custom Act 1962, GST Act and other related Acts and Laws and Regulations of India with their latest amendments, as applicable. Purchaser shall not entertain any requests for clarifications from the bidder regarding such local conditions.

ii. It must be understood and agreed that such factors have properly been investigated and considered while submitting the Tender. Any claim for financial or Forex or any other adjustments to Value of Contract, on lack of clarity of such factors shall not be entertained.

14. EXTENSION OF TIME FOR COMPLETION

i. The time for completion as specified in the SCC is firm & final binding till the final completion of the Plant facilities. The Time(s) for Completion specified in the SCC shall be extended if the Contractor is delayed or impeded in the Performance of any of its obligations under the Contract by reason of any of occurrence of Force Majeure as provided in the Tender for Force Majeure.

ii. Any genuine delay in approval of technical detailed drawings, issuance of amendment of purchase order, conducting inspection and approval of inspection test/tests certificates for allowing dispatches etc. will count towards extension of delivery period by corresponding period other than admissible under Force Majeure conditions, if any, substantiated by the supplier and duly accepted by the Purchasing Authority.

iii. The Contractor shall at all times use its reasonable efforts to minimize any delay in the Performance of its obligations under the Contract.

[D] GENERAL OBLIGATIONS

15. GENERAL OBLIGATIONS

15.1 PRIORITY OF CONTRACT DOCUMENTS

Several documents forming the Contract are to be taken as mutually explanatory of one another, but in case of ambiguities or discrepancies the same shall be explained and adjusted by the Purchaser who shall thereupon issue to the Contractor instructions thereon and in such event, unless otherwise provided in the Contract, the priority of the documents forming the Contract shall be as follows:

a) Contract Agreement and the appendices, along with the amendments, if any thereto
b) Letter of award (LOA).
c) Special Conditions of Contract
d) General Conditions of Contract
e) BDS & ITB
f) Special Technical Conditions on Technical Specifications
g) Technical Specifications and Drawings
h) Price Schedules submitted by the Contractor
i) Other completed Bidding forms submitted with the Bid
j) Any other documents forming part of the Purchaser's Requirements

In the event of any ambiguity or conflict between the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed above. For eg. Contract agreement have precedence over LOA.

15.2 HEADINGS AND MARGINAL NOTES

All headings and marginal notes to the clauses of these General Conditions of Contract or to the Specifications or to any other Tender Document are solely for the purpose of giving a concise indication and not a summary of the contents thereof, and they shall never be deemed to be part thereof or be used in the interpretation or construction thereof the Contract.

15.3 SINGULAR AND PLURAL

In Contract Documents unless otherwise stated specifically, the singular shall include the plural andvice versa wherever the context so requires.

15.4 INTERPRETATION

Words implying ‘Persons' shall include relevant Corporate Companies/ Registered Associations/ Board/Body of Individuals/ Firm of Partnership' as the case may be.

16. SPECIAL CONDITIONS OF CONTRACT (SCC)

i. Special Conditions of Contract shall be read in conjunction with the General Conditions of Contract, Specification of Work, Drawings and any other documents forming part of this Contract wherever the context so requires.

ii. Notwithstanding the sub-division of the documents into these separate sections and volumes every part of each shall be deemed to be supplementary to and complementary of every other part and shall be read with and into the Contract so far as it may be practicable to do so.

iii. Where any portion of the General Condition of Contract is repugnant to or at variance with any provisions of the Special Conditions of Contract, unless a different intention appears the provisions of the Special Conditions of Contract shall be deemed to over-ride the provisions of the General Conditions of Contract and shall to the extent of such repugnancy, or variations, prevail.

iv. Wherever it is mentioned in the specifications that the Contractor shall perform certain Work or provide certain facilities, it is understood that the Contractor shall do so at his cost and the Value ofContract shall be deemed to have included cost of such performance and provisions, so mentioned.

v. The materials, design and workmanship shall satisfy the relevant Indian Standards, the Job Specifications contained herein and Codes referred to. Where the job specification stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied.

17. CONTRACTOR TO OBTAIN HIS OWN INFORMATION

The Contractor in fixing his cost shall for all purpose whatsoever reason may be, deemed to have himself independently obtained all necessary information for the purpose of preparing his tender and his tender as accepted shall be deemed to have taken into account all contingencies as may arise due to such information or lack of same. The correctness of the details, given in the Tender Document to help the Contractor to make up the tender is not guaranteed. The Contractor shall be deemed to have examined the Contract Documents, to have generally obtained his own information in all matters whatsoever that might affect the carrying out of the works at the schedules rates and to have satisfied himself to the sufficiency of his tender.

Any error in description of quantity or omission therefrom shall not vitiate the Contract or release the Contractor from executing the work comprised in the Contract according to Drawings and Specifications at the scheduled Prices. He is deemed to have known the scope, nature and magnitude of the Works and the requirements of materials and labour involved etc., and as to what all works, he has to complete in accordance with the Contract documents whatever be the defects, omissions or errors that may be found in the Documents. The Contractor shall be deemed to have visited surroundings, to have satisfied himself to the nature of all existing structures, if any, and also as to the nature and the conditions of the Railways, Roads, Bridges and Culverts, means of transport and communication, whether by land, water or air, and as to possible interruptions thereto and the access and egress from the site, to have made enquiries, examined and satisfied himself as to the sites for obtaining sand, stones, bricks and other materials, the sites for disposal of surplus materials, the available accommodation as to whatever required, depots and such other buildings as may be necessary for executing and completing the works, to have made local independent enquiries as to the sub-soil, subsoil water and variations thereof, storms, prevailing winds, climatic conditions and all other similar matters effecting these works.

He is deemed to have acquainted himself as to his liability of payment of Government Taxes, Customs duty and other charges, levies etc. Any neglect or omission or failure on the part of the Contractor in obtaining necessary and reliable information upon the foregoing or any other matters affecting the

Contract shall not relieve him from any risks or liabilities or the entire responsibility from completion of the works at the scheduled prices and times in strict accordance with the Contract. It is, therefore, expected that should the Contractor have any doubt as to the meaning of any portion of the tender Document he shall set forth the particulars thereof in writing to Purchaser in duplicate,before submission of tender.

The Purchaser may provide such clarification as may be necessary in writing to Contract, such clarifications as provided by Purchaser shall form part of tender Documents. No verbal agreement or inference from conversation with any effect or employee of the Purchaser either before, during or after the execution of the Contract Agreement shall in any way affect or modify and of the terms or obligations herein contained. Any change in layout due to site conditions or technological requirement shall be binding on the Contractor and no extra claim on this account shall be entertained.

18. TIME OF PERFORMANCE

18.1 TIME FOR MOBILIZATION

The work covered by this Contract shall be commenced immediately upon issuance of the Letter of Award (LOA) and be completed on or before the dates as mentioned in the Time Schedule of Completion of Work under Section - V, Special Conditions of Contract (SCC). The Contractor should bear in mind that time is the essence of this contract agreement. Request for revision of construction time after tenders are opened will not receive any consideration. The mobilization period is included within the overall Completion Schedule, not over and above the completion time to any additional work or any other reasons.

18.2 TIME SCHEDULE OF CONSTRUCTION

i. The general time schedule of construction is given in the Section - V, Special Conditions of Contract (SCC) of the Tender Documents. Contractor should prepare a detailed monthly or weekly construction program. The Work shall be executed strictly as per the Time Schedule given in the Tender Documents. The period of construction given includes the time required for mobilization testing, rectifications, if any, retesting and completion in all

respects in accordance with Contract Document.

ii. The Contractor shall submit a detailed PERT network consisting of adequate number of activities covering various key phases of the Work such as Design, Procurement, Manufacturing, Shipment and Field Erection activities. This network shall also indicate the interface facilities to be provided by the Purchaser/ site-in-charge, if any and the dates by which such facilities are needed.

19. FORCE MAJEURE

i. The supplier shall not be liable for any penalty charges due to delay in manufacture or delivery of material resulting from any causes beyond the supplier's reasonable control including but not limited to compliance with regulations, orders or instructions of Central/State or Municipal Govt. or Agency, thereto, acts of God, Acts of Civil & Military authorities, fires, floods, strikes, lockouts, freight embargoes, war risks, riots and civil commotions. The supplier will seek extension of delivery period within three weeks of occurrence of such an event and clearly state anticipated delay in supply on account of such an event/event. On receipt of such request from the supplier, extension in delivery period may be granted for the period for which the completion of work is proved by the supplier to have been delayed for circumstances covered by reasons of 'Force Majeure' subject to further conditions that if the delivery period is likely to be extended by more than 60 days on account of any event, the purchaser shall have the option to accept any portion of the balance material and cancel the order for the rest provided, however, that if material had been manufactured exclusively for the purchaser under contract prior to the commencement of FORCE MAJEURE circumstances, it shall be accepted by the purchaser and the cancellation will be without any liability for damages on the part of the supplier and without any payment of compensation by the BBMB.

ii. FORCE MAJEURE EXCLUSIONS

Force Majeure shall not include (i) any event or circumstance which is within the reasonable control of the Parties and (ii) the following conditions, except to the extent that they are consequences of an event of Force Majeure:

- Unavailability, late delivery, or changes in cost of the plant, machinery, equipment, materials,spare parts or consumables for the Power Project;
- Delay in the performance of any contractor, sub-contractor or their agents;
- Non-performance resulting from normal wear and tear typically experienced in power generationmaterials and equipment;
- Strikes at the facilities of the Contractor / Affected Party;
- Insufficiency of finances or funds or the agreement becoming onerous to perform; and
- Non-performance caused by, or connected with, the Affected Party's:o Negligent or intentional acts, errors or omissions;
  - Failure to comply with an Indian Law; or
  - Breach of, or default under this Contract Agreement.
- Normal rainy seasons and monsoon
- Any Transport strikes not directly affecting the delivery of goods from manufacturer to site.

20. Liquidated Damages (LD)

i. Subject to Force Majeure Clause, in case the Contractor fails to achieve successful Commissioning of plant by the due date indicated in Time Schedule/Timeline Clause 1 of SCC, then BBMB shall levy the Liquidated Damages on the Contractor (wherein partial commissioning shall not be accepted) as per SCC clause 2 of NIT.

ii. The Purchaser may, without prejudice to any other method of recovery, deduct the amount of such damages from any amount due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract. Once the maximum limit is reached, Purchaser may consider the termination of contract or may have the discretion of getting executed the work from the contractor with the maximum limit of Liquidated damages. Any such recovery on account of the Liquidated damages can be done from the running bills of the contractor by Purchaser or from PBG/Security Deposit/retention money etc.

iii. The Purchaser shall as an alternative to the Liquidated Damages at its option, get work executed from elsewhere at the risk and cost of the Contractor irrespective of the fact whether the scope of Contract is identical to the original scope of Contract and in case the Purchaser chooses the alternative course as mentioned, it will be entitled to recover compensation/ damages from the Contractor irrespectiveof maximum limit prescribed under Clause 20(i).

iv. The Purchaser may by giving (01) one month notice to the Contractor cancel the Contract without prejudice to the Purchaser's right under Clauses 20(i) and 20(ii) any other provisions contained in the Contract to determine the Contract and claim damaged from the Contractor.

v. All sums recovered from the contractor by way of Liquidated Damages under any of the conditions of the contract shall be considered as reasonable without reference to the actual loss or damage, which shall have been sustained by the BBMB. The Contractor shall not raise the question of proving actual loss suffered by the Purchaser consequenton the said delay in Completion.

vi. The Time for Completion for whole of the facilities means the timelines provided for commissioning in line with the SCC clause No 1 i.e. Time Schedule/Timelines.

vii. For calculation of Liquidated damage, date of LOA shall be the reference date.

viii. No bonus will be given for earlier Commissioning of the Facilities or part thereof.

21. RIGHTS OF THE PURCHASER TO FORFEIT CONTRACT PERFORMANCE SECURITY

Whenever any claim against the Contractor for the payment of a sum of money arises out or underthe Contract, the Purchaser shall be entitled to recover such sum by appropriating in part or whole the Contract Performance Security of the

Contractor. In the event of the security being insufficient or if no security has been taken from the Contractor, then the balance or the total sum recoverable, as the case may be shall be deducted from any sum then due or which at any time thereafter may become due to the Contractor. The Contractor shall pay to the Purchaser on demand any balance remaining due.

22. FAILURE BY THE CONTRACTOR TO COMPLY WITH THE PROVISIONS OF THE CONTRACT

i. If the Contractor refuses or fails to execute the Work or any separate part thereof with such diligence as will ensure its completion within the time specified in the Contract or extension thereof or fails to perform any of his obligation under the Contract or in any manner commits a breach of any of the provisions of the Contract it shall be open to the Purchaser at its option by written notice to the Contractor:

a) To determine the event in which the Contract shall stand terminated and shall cease to be in force and effect on and from the date appointed by the Purchaser on that behalf, whereupon the Contractor shall stop forthwith any of the Contractor's work then in progress, except such work as the Purchaser may, in writing, require to be done to safeguard any property or work, or installations from damage, and the Purchaser, for its part, may take over the work remaining unfinished by the Contractor and complete the same through a fresh Contractor or by other means, at the risk and cost of the Contractor, and any of his sureties if any, shall be liable to the Purchaser for any excess cost occasioned by such work having to be so taken over and completed by the Purchaser over and above the cost as specified in the schedule of rates.

b) Without determining the Contract to take over the work of the Contractor or any part thereof and complete the same through a fresh Contractor or by other means at the risk and cost of the Contractor. The Contractor and any of his sureties are liable to the Purchaser for any excess cost over and above the cost at the rates specified in the Schedule of Rates, occasioned by such works having been taken over and completed by the Purchaser.

ii. In such events of Clause 22(i)(a) or (b) above.

a) The whole or part of the Contract Performance Security furnished by the Contractor is liable to be forfeited without prejudice to the right of the Purchaser to recover from the Contractor the excess cost referred to in the Clause aforesaid, the Purchaser shall also have the right of taking possession and utilizing in completing the works or any part thereof, such as materials, equipment and plants available at work site belonging to the Contractor as may be necessary and the Contractor shall not be entitled for any compensation for use or damage to such materials, equipment and plant.

b) The amount that may have become due to the Contractor on account of work already executed by him shall not be payable to him until after the expiry of 06 (Six) calendar months reckoned from the date of termination of Contract or from the taking over of the Work or part thereof by the Purchaser as the case may be, during which period the responsibility for faulty materials or workmanship in respect of such work shall, under the Contract, rest exclusively with the Contractor. This amount shall be subject to deduction of any amounts due from the Contract to the Purchaser under the terms of the Contract authorized or required to be reserved or retained by the Purchaser.

iii. Before determining the Contract as per Clause 22(i)(a) or (b) provided in the judgement of the Purchaser, the default or defaults committed by the Contractor is/ are curable and can be cured by the contractor if an opportunity given to him, then the Purchaser may issue Notice in writing calling the Contractor to cure the default within such time specified in the Notice.

iv. The Purchaser shall also have the right to proceed or take action as per 22(i)(a) or (b) above, in the event that the Contractor becomes bankrupt, insolvent, compounds with his creditors, assigns the Contract in favor of his creditors or any other person or persons, or being a company or a corporation goes into voluntary liquidation, provided that in the said events it shall not be necessary for the Purchaser to give any prior notice to the Contractor.

v. Termination of the Contract as provided for in sub- clause 22(i)(a) above shall not prejudice or affect their rights of the Purchaser which may have accrued up to the date of such termination.

23. CONTRACTOR REMAINS LIABLE TO PAY COMPENSATION IF

In any case in which any of the powers conferred upon the Purchaser by Clause 22.0 thereof shall have become action not taken under clause 22 exercisable and the same had not been exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable in the event of any further case of default by the Contractor for which by any clause or clauses hereof he is declared liable to pay compensation amounting to the whole of his Contract Performance Security, and the liability of the Contractor for past and future compensation shall remain unaffected.

24. CONTRACT PERFORMANCE SECURITY

Separate EPC/LSTK contract and AMC contract shall be released by Purchaser to single successful bidder for Bhiwani and Hisar site respectively.

Accordingly successful bidder has to submit an unconditional and irrevocable separate Contract Performance Security for an amount equivalent to 10 (Ten) percent of contract price for EPC and AMC, separately for two sites i.e. Bhiwani and Hisar within 30 (Thirty) days from the issuance of the Letter of Award by the Purchaser.

The Contract Performance Security shall be in the form of either Demand Draft or Bank Guarantee and shall be in the currency of the Contract and will be issued in the name of the Purchaser as specified in NIT.

The **validity** of Contract Performance Security for **EPC contract i.e. Supply and service shall be up to Final Acceptance of Plant** (*Final Acceptance means acceptance of complete project by the Purchaser at the end of one year from the date of Operational Acceptance and upon demonstration of minimum annual parameters as specified in the technical specifications and completion of works under the punch list which certifies the Contractor's fulfilment of the Contract in respect of Functional and Plant Performance Guarantees of the Facilities)*.

However in case of any delay, the PBG shall be extended suitably. Also in case bidder fails to demonstrate annual CUF as defined, the PBG shall be extended for another one year and shall be released 'Only' after demonstration of Annual CUF for the next year.

However validity of Contract Performance Security for **AMC** contract shall be initially for a period of **5 years from the date of operational acceptance** and in case of extension of AMC by BBMB for another 5 years as per the provision of contract. Further the performance bank guarantee shall be kept valid till such time any claim of the purchaser is pending against the contractor.

The PBG and EMD/Security Deposit shall be forfeited in case bidder refuse or deviate from the offered capacity. While quoting MW (AC) capacity bidder has to take all the site aspects i.e. site conditions, space available etc. Once capacity MW(AC) quoted cannot be changed, even during detailed Design and Engineering. In case bidder deviates or refuses from offered capacity MW(AC), may lead to forfeit of EMD/Security deposit and Performance Bank Guarantee.

The Contract Performance Security shall be towards faithful performance of the contractual obligations, performance of equipment.

The performance Bank Guarantees shall be issued by any Indian Scheduled Bank a company registered under Companies Act, 1956 (Banking Statute / body corporate constituted under the Banking companies Acquisition and Transfer of Undertakings Act-V of 1970 and denominated in the currency of the contract and shall be in the form of irrevocable Bank Guarantee in the format attached .

Failure to provide performance security, within specified time shall be the cause for cancellation of the Letter of Award/contract agreement and the forfeiture of EMD/security deposit, besides taking other legal action as deemed fit.

In case of default or failure of the Contractor to comply with the requirements of any of the Obligations covered under this Tender Document and/ or Contract Agreement shall constitute sufficient grounds for forfeiture of the Contract Performance Security.

The Contract Performance Security has to cover the entire contract value including extra works/ services also. As long as the Contract Performance Security submitted at the time of award takes care the extra works/ services executed and total executed value are within the awarded contract price, there is no need for additional Contract Performance Security. As soon as the total executed value is likely to burst the ceiling of awarded contract price, the contractor should furnish additional Contract Performance Security for the additional amount in excess to the original contract value.

If the Contractor/ Sub-Contractor or their employees or the Contractor's agents and representatives shall damage, break, deface or destroy any property belonging to the Purchaser or others during the execution of the Contract, the same shall be made good by the Contractor at his own expenses and in default thereof, the Site-in-Charge may cause the same to be made good by other agencies and recover expenses from the Contractor (for which the certificate of the Site-in-Charge shall be final).

All compensation or other sums of money payable by the Contractor to the Purchaser under terms of this Contract may be deducted from or paid by the encashment or sale of a sufficient part of his Contract Performance Security or from any sums which may be due or may become due to the Contractor by the Purchaser of any account whatsoever and in the event of his Contract Performance Security being reduced by reasons of any such deductions or sale of aforesaid, the Contractor shall within 10 (Ten) days thereafter make good in cash, bank drafts as aforesaid any sum or sums which may have been deducted from or realized by sale of his Contract Performance Security, or any part thereof.

No interest shall be payable by the Purchaser for sum deposited as Contract Performance Security.
Part Security shall not be accepted.

The performance security in the form of bank guarantee shall be as per (Annexure - 9).

The security shall be returned to the contractor immediately after its expiration, provided, however, that if the contractor is liable for an extended warranty/defect liability obligation, the performance security shall be extended for a subsequent period from the time such replacement/repairs of the facilities or any part thereof becomes applicable.

25. TERMINATION OF CONTRACT

25.1 TERMINATION FOR PURCHASER'S CONVENIENCE

25.1.1 The Purchaser may at any time terminate the Contract for any reason by giving the Contractor a notice of termination that refers to this GCC Sub-Clause 25.1.

25.1.2 Upon receipt of the notice of termination under GCC Sub-Clause 25.1.1, the Contractor shall either immediately or upon the date specified in the notice of termination

a) cease all further work, except for such work as the Purchaser may specify in the notice of termination for the sole purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition.

b) terminate all subcontracts, except those to be assigned to the Purchaser pursuant to paragraph (d) (ii) below.

c) remove all Contractor's Equipment from the Site, repatriate the Contractor's and its Subcontractors' personnel from the Site, remove from the Site any wreckage, rubbish and debris of any kind, and leave the whole of the Site in a clean and safe condition, and

d) subject to the payment specified in GCC Sub-Clause 25.1.3,

i) deliver to the Purchaser the parts of the Facilities executed by the Contractor up to the date of termination.

ii) to the extent legally possible, assign to the BBMB all right, title and benefit of the Contractor to the Facilities and to the Plant as of the date of termination, and, as may be required by the Purchaser, in any subcontracts concluded between the Contractor and its Subcontractors; and

iii) deliver to the BBMB all non-proprietary drawings, specifications and other documents prepared by the Contractor or its Subcontractors as

at the date of termination in connection with the Facilities.

25.1.3 In the event of termination of the Contract under GCC Sub-Clause 25.1.1, the Purchaser shall pay to the Contractor the following amounts:

a) the Contract Price, properly attributable to the parts of the Facilities executed by the Contractor as of the date of termination.
b) the costs reasonably incurred by the Contractor in the removal of the Contractor's Equipment from the Site and in the repatriation of the Contractor's and its Subcontractors' personnel.
c) any amounts to be paid by the Contractor to its Subcontractors in connection with the termination of any subcontracts, including any cancellation charges.
d) costs incurred by the Contractor in protecting the Facilities and leaving the Site in a clean and safe condition pursuant to paragraph (a) of GCC Sub-Clause 25.1.2.
e) the cost of satisfying all other obligations, commitments and claims that the Contractor may in good faith have undertaken with third Parties in connection with the Contract and that are not covered by paragraphs (a) through (d) above.

25.2 TERMINATION FOR CONTRACTOR'S DEFAULT

25.2.1 Neither the Purchaser nor the Contractor may assign the Contract or any part thereof, or any right, benefit, obligation, or interest therein or thereunder, to any third party without the express prior written consent of the other Party, which consent shall not be unreasonably withheld, except that the Contractor shall be entitled to assign any monies due and payable to it or that may become due and payable to it under the Contract, either absolutely or by way of charge.

25.2.2 The Purchaser, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith in the following circumstances by giving a notice of termination and its reasons therefor to the Contractor, referring to this GCC Sub-Clause 25.2:

a) if the Contractor becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, if the Contractor is a corporation, a resolution is passed or order is made for its winding up, other

than a voluntary liquidation for the purposes of amalgamation or reconstruction, a receiver is appointed over any part of its undertaking or assets, or if the Contractor takes or suffers any other analogous action in consequence of debt

b) if the Contractor assigns or transfers the Contract or any right or interest therein in violation of the provision of GCC Clause 25.2.1.

c) if the Contractor, in the judgment of the Purchaser has engaged in Fraud and Corruption in competing for or in executing the Contract.

25.2.3 If the Contractor

a) has abandoned or repudiated the Contract.

b) has without valid reason failed to commence work on the Facilities promptly or has suspended the progress of Contract performance for more than twenty-eight (28) days after receiving a written instruction from the Purchaser to proceed.

c) Persistently fails to execute the Contract in accordance with the Contract or persistently neglects to carry out its obligations under the Contract without just cause.

d) Refuses or is unable to provide sufficient materials, services or labor to execute and complete the Facilities in the manner specified in the program at rates of progress that give reasonable assurance to the Purchaser that the Contractor can attain Completion of the Facilities by the Time for Completion as extended,

Then the Purchaser may, without prejudice to any other rights it may possess under the Contract, give a notice to the Contractor stating the nature of the default and requiring the Contractor to remedy the same. If the Contractor fails to remedy or to take steps to remedy the same within fourteen (14) days of its receipt of such notice, then the Purchaser may terminate the Contract forthwith by giving a notice of termination to the Contractor that refers to this GCC Sub-Clause 25.2.

25.2.4 Upon receipt of the notice of termination under GCC Sub-Clauses 25.2.2 or 25.2.3, the Contractor shall, either immediately or upon such date as is specified in the notice of termination,

a) cease all further work, except for such work as the Purchaser may specify in the notice of termination for the sole purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition

b) Terminate all subcontracts, except those to be assigned to the Purchaser pursuant to paragraph (d) below.

c) Deliver to the Purchaser the parts of the Facilities executed by the Contractor up to the date of termination.

d) To the extent legally possible, assign to the Purchaser all right, title and benefit of the Contractor to the Facilities and to the Plant as of the date of termination, and, as may be required by the Purchaser, in any subcontracts concluded between the Contractor and its Subcontractors.

e) Deliver to the Purchaser all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Facilities.

25.2.5 The Purchaser may enter upon the Site, expel the Contractor, and complete the Facilities itself or by employing any third Party. The Purchaser may, to the exclusion of any right of the Contractor over the same, take over and use with the payment of a fair rental rate to the Contractor, with all the maintenance costs to the account of the Purchaser and with an indemnification by the Purchaser for all liability including damage or injury to persons arising out of the Purchaser's use of such equipment, any Contractor's Equipment owned by the Contractor and on the Site in connection with the Facilities for such reasonable period as the Purchaser considers expedient for the supply and installation of the Facilities.

Upon completion of the Facilities or at such earlier date as the Purchaser thinks appropriate, the Purchaser shall give notice to the Contractor that such Contractor's Equipment will be returned to the Contractor at or near the Site and shall return such Contractor's Equipment to the Contractor in accordance with such notice. The Contractor shall thereafter without delay and at its cost remove or arrange removal of the same from the Site.

25.2.6 Subject to GCC Sub-Clause 25.2.7, the Contractor shall be entitled to be paid

the Contract Price attributable to the Facilities executed as of the date of termination, the value of any unused or partially used Plant on the Site, and the costs, if any, incurred in protecting the Facilities and in leaving the Site in a clean and safe condition pursuant to paragraph (a) of GCC Sub-Clause 25.2.4. Any sums due the Purchaser from the Contractor accruing prior to the date of termination shall be deducted from the amount to be paid to the Contractor under this Contract.

25.2.7 If the Purchaser completes the Facilities, the cost of completing the Facilities by the Purchaser shall be determined.

If the sum that the Contractor is entitled to be paid, pursuant to GCC Sub-Clause 25.2.6, plus the reasonable costs incurred by the Purchaser in completing the Facilities, exceeds the Contract Price, the Contractor shall be liable for such excess.

If such excess is greater than the sums due the Contractor under GCC Sub-Clause 25.2.6, the Contractor shall pay the balance to the Purchaser, and if such excess is less than the sums due the Contractor under GCC Sub-Clause 25.2.6, the Purchaser shall pay the balance to the Contractor.

The Purchaser and the Contractor shall agree, in writing, on the computation described above and the manner in which any sums shall be paid.

25.3 TERMINATION BY THE CONTRACTOR

25.3.1 If

a) the Purchaser has failed to pay the Contractor any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents, or commits a substantial breach of the Contract, the Contractor may give a notice to the Owner that requires payment of such sum, with interest, requires approval of such invoice or supporting documents, or specifies the breach and requires the Purchaser to remedy the same, as the case may be. If the Purchaser fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, fails to remedy the breach or take steps to remedy the breach within fourteen (14) days after receipt of the Contractor’s notice, or

b) the Contractor is unable to carry out any of its obligations under the

Contract for any reason attributable to the Purchaser, including but not limited to the Purchaser's failure to provide possession of or access to the Site or other areas or failure to obtain any governmental permit necessary for the execution and/or completion of the Facilities, then the Contractor may give a notice to the Purchaser thereof, and if the Purchaser has failed to pay the outstanding sum, to approve the invoice or supporting documents, to give its reasons for withholding such approval, or to remedy the breach within twenty-eight (28) days of such notice, or if the Contractor is still unable to carry out any of its obligations under the Contract for any reason attributable to the Purchaser within twenty-eight (28) days of the said notice, the Contractor may by a further notice to the Purchaser referring to this GCC Sub-Clause 25.3.1, forthwith terminate the Contract.

25.3.2 The Contractor may terminate the Contract forthwith by giving a notice to the Purchaser to that effect, referring to this GCC Sub-Clause 25.3.2, if the Purchaser becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, being a corporation, if a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Purchaser takes or suffers any other analogous action in consequence of debt.

25.3.3 If the Contract is terminated under GCC Sub-Clauses 25.3.1 or 25.3.2, then the Contractor shall immediately:

a) cease all further work, except for such work as may be necessary for the purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition.
b) terminate all subcontracts, except those to be assigned to the Owner pursuant to paragraph (d) (ii).
c) remove all Contractor's Equipment from the Site and repatriate the Contractor's and its Subcontractors' personnel from the Site, and
d) subject to the payment specified in GCC Sub-Clause 25.3.4,
    i) deliver to the Purchaser the parts of the Facilities executed by the Contractor up to the date of termination.
    ii) to the extent legally possible, assign to the Purchaser all right, title and

benefit of the Contractor to the Facilities and to the Plant as of the date of termination, and, as may be required by the Purchaser, in any subcontracts concluded between the Contractor and its Subcontractors, and

iii) deliver to the Purchaser all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Facilities.

25.3.4 If the Contract is terminated under GCC Sub-Clauses 25.3.1 or 25.3.2, the Purchaser shall pay to the Contractor all payments specified in GCC Sub-Clause 25.1.3, and reasonable compensation for all loss, except for loss of profit, or damage sustained by the Contractor arising out of, in connection with or in consequence of such termination.

25.3.5 Termination by the Contractor pursuant to this GCC Sub-Clause 25.3 is without prejudice to any other rights or remedies of the Contractor that may be exercised in lieu of or in addition to rights conferred by GCC Sub-Clause 25.3.

25.4 In this GCC Clause 25, the expression “Facilities executed” shall include all work executed, Installation Services provided, and all Plant acquired, or subject to a legally binding obligation to purchase, by the Contractor and used or intended to be used for the purpose of the Facilities, up to and including the date of termination.

25.5 In this GCC Clause 25, in calculating any monies due from the Purchaser to the Contractor, account shall be taken of any sum previously paid by the Purchaser to the Contractor under the Contract, including any advance payment.

25.6 Termination of Contract for Non-Performance and Subsequently Putting the Contractor on Banning List:

In case of termination of Contract herein set forth (under clause 22.0) except under conditions of Force Majeure and termination after expiry of contract, the Contractor shall be put under Banning List [i.e. neither any enquiry will be issued to the party by BBMB against any type of tender nor their offer will be

considered by BBMB against any ongoing tender(s) where contract between BBMB and that particular Contractor (as a bidder) has not been finalized] for a period as decided by the BBMB to such Contractor

26. MEMBERS OF THE BBMB NOT INDIVIDUALLY LIABLE

No employee of the BBMB shall in any way be personally bound or liable for the acts or obligations under the Contract or answerable for any default or omission in the observance or performance of any of the acts, matters or things which are herein contained.

27. PURCHASER NOT BOUND BY PERSONAL REPRESENTATIONS

The Contractor shall not be entitled to any increase on the price or any other right or claim whatsoever by reason of any representation, explanation statement or alleged representation, promise or guarantees given or alleged to have been given to him by any person.

28. CONTRACTOR'S OFFICE AT SITE & VEHICLE REQUIREMENT FOR MOBILITY AT SITE

The Contractor shall provide and maintain an office at the site and such office shall be open at all reasonable hours to receive instructions, notice or other communications at his own cost shall get the clearance of local authorities/Site-in-charge for setting up/construction of such facilities. Such office shall be open at all reasonable hours to receive instructions, notice or other communications.

Further contractor shall also ensure availability of required Vehicle with driver and fuel/Maintenance/Consumables etc. for the purpose of Mobility in and around the site for official purposes of its staff at its own cost. The vehicle as mentioned is to be provided during project construction and performance of project.

29. CONTRACTOR'S SUBORDINATE STAFF AND THEIR CONDUCT

i) The Contractor, on or after award of the Work shall name and depute a qualified Engineer having sufficient experience in carrying out work of similar nature, to whom the equipment, materials, if any, shall be issued and instructions for works given. The Contractor shall also provide sufficient and

qualified staff to superintend the execution of the Work, competent sub-agents, foremen and leading hands including those specially qualified by previous experience to supervise the types of works comprised in the Contract in such manner as will ensure work of the best quality, expeditious working. Whenever in the opinion of the Site-in-Charge additional properly qualified supervisory staff is considered necessary, they shall be employed by the Contractor without additional charge on accounts thereof. The Contractor shall ensure that Sub-Contractors, if any, shall provide competent and efficient supervision, over the work entrusted to them.

ii) If and whenever any of the Contractor's or Sub-Contractor's agents, sub-agents, assistants, foremen, or other employees be guilty of any misconduct or be incompetent or insufficiently qualified or negligent in the performance of their duties, it is undesirable for administrative or any other reason for such person or persons to be employed in the works, the Contractor, shall at once remove such person or persons from employment thereon. Any person or persons so removed from the works shall not again be employed in connection with the Works. Any person so removed from the Work shall be immediately re-placed at the expense of the Contractor by a qualified and competent substitute. Should the Contractor be requested to repatriate any person removed from the works he shall do so and shall bear all costs in connection herewith.

iii) The Contractor shall be responsible for the proper behavior of all the staff, foremen, workmen, and others, and shall exercise a proper degree of control over them and in particular and without prejudice to the said generality, the Contractor shall be bound to prohibit and prevent any employees from trespassing or acting in any way detrimental or prejudicial to the interest of the community or of the properties or occupiers of land and properties in the neighborhood and in the event of such employee so trespassing, the Contractor shall be responsible therefore and relieve the Purchaser/Site-In-Charge of all consequent claims or actions for damages or injury or any other grounds whatsoever. The Contractor shall be liable for any liability to Purchaser on account of deployment of Contractor's staff etc.

or incidental or arising out of the execution of Contract. The Contractor shall be liable for all acts or omissions on the part of his staff, Foremen and Workmen and others in his employment, including misfeasance or negligence of whatever kind in the course of their work or during their employment,which are connected directly or indirectly with the Contract.

iv) If and when required by the Purchaser and Contractor's personnel entering upon the Purchaser's premises shall be properly identified by badges or gate passes which must be worn at all times on Purchaser's premises. Contractor may be required to obtain daily entry passes for his Staff/ Employees to work within operating areas. These being safety requirements, no relaxations on this account shall be given to Contractor.

v) Contractor shall at all times provide BBMB access to site and office during construction / AMC periods and also provide them with any data / information sought for.

30. SUB-LETTING OF WORKS

i. Sub-contracting other than for labour contract / engagement of labour, shall be permitted with the information and approval to the site-in-charge. However, sub-contracting for 100% of the contract on back-to-back basis shall not be permitted. Any part of the Contract nor any share or interest therein shall in any manner or degree be transferred, assigned or sublet by the Contractor directly or indirectly to any person, firm or corporation whatsoever without the consent in writing, of the Purchaser except as provided for in the succeeding Clause.

a) **SUB-CONTRACTS FOR TEMPORARY WORKS ETC.**

The Purchaser may give written consent to Sub-Contract for the execution of any part of the Work at the site, being entered in to by Contractor provided each individual Sub-contract is informed to the Site-in-Charge.

b) **LIST OF SUB-CONTRACTORS TO BE SUPPLIED**

The Contractor shall furnish and get approve from the Site-in-Charge, the list of all Sub-Contractors or other persons or firms engaged by the

Contractor and working at the Site during the previous month with particulars of the general nature of the Subcontract or works done by them.

c) **CONTRACTOR'S LIABILITY NOT LIMITED BY SUB-CONTRACTOR**

Notwithstanding any sub-letting with such approval as aforesaid and not withstanding that the Site-in-Charge shall have received copies of any Subcontracts, the contractor shall be and shall remain solely responsible for the quality, proper and expeditious execution of the Contract in all respects as if such sub-letting or Subcontracting had not taken place, and as if such work had been done directly by the Contractor. The Contractor shall bear all responsibility for any act or omission on the part of sub-contractors in regard to work to be performed under the Contract.

d) **NO REMEDY FOR ACTION TAKEN UNDER THIS CLAUSE**

No action taken by the Purchaser under the clause shall relieve the Contractor of any of his liabilities under the Contract or give rise to any right or compensation, extension of time or otherwise failing which the Purchaser shall have the right to remove such Sub-Contractor(s) from the site.

e) **TERMINATION/ CANCELLATION OF CONTRACT**

Purchaser is nowhere liable for the communication, acts and deeds and performance of the sub-contractor as engaged by the principal contractor. Principal Contractor solely is responsible and liable for the entire execution of project and performance of contract. In case of non-performance of the sub-contractor in lieu of inadequate liquidity, technical competence, adequate manpower Purchaser may take an appropriate decision to get the work done at the risk and cost of the principal contractor.

Subject to poor performance and prolonged delay of the project on account of inefficient sub-letting of the project work, Purchaser may take a final decision to terminate the contract of the principal contractor which will be binding and non-revertible and henceforth

no plea in this regard shall be entertained.

The Contractor has to execute the work by functioning like a contractor instead of sub-letting the entire work on back-to-back basis. The entire work cannot be sub-let to a sub-contractor on back-to-back basis.

f) Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives or Subcontractors engaged by the Contractor in connection with the Performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Purchaser. Nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives or Subcontractors and the purchaser.

g) Under no circumstances the sub-contractor shall claim or shall put any binding to the Purchaser and at all times the sub-contractor must be managed by the Contractor. The Purchaser shall not be responsible for any claims at any time by the Contractor in relation to the sub-contractor.

h) No relaxation, forbearance, delay or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

i) Any waiver of a party's rights, powers or remedies under the Contract must be in writing, must be dated and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

j) The Contractor shall be solely responsible for ensuring that his sub-

Contractors fulfil and comply with the statutory requirements of Labour and other Laws.

31. POWER OF ENTRY

If the Contractor shall not commence the Work in the manner previously described in the Contract documents or if he shall at any time in the opinion of the Site-In-Charge:

i) fail to carry out the Work in conformity with the Contract documents, or

ii) fail to carry out the Work in accordance with the Time Schedule, or

iii) substantially suspend the Work for a period of minimum 14 (Fourteen) days without authority from the Site-In-Charge, or

iv) fail to supply sufficient or suitable construction plant, temporary works, labour, materials or things, or

v) Commit, suffer, or permit any other breach of any of the provisions of the Contract on his part to be performed or observed or persist in any of the above-mentioned breaches of the Contract for 14 (Fourteen) days, after notice in writing shall have been given to the Contractor by the Site-in-Charge requiring such breach to be remedied, or

vi) if the Contractor abandon the Work, or

vii) If the Contractor during the continuance of the Contract shall become bankrupt, make any arrangement or composition with his creditors, or permit any execution to be levied or go into liquidation whether compulsory or voluntary not being merely a voluntary liquidation for the purpose of amalgamation or reconstruction then in any such case, the Purchaser shall have the power to enter upon the Work and take possession thereof and of the materials, temporary Work, construction plant, and stock thereon, and to revoke the Contractor's license to use the same, and to complete the Work by his agents, other Contractors or workmen or to relate the same upon any terms and to such other person, firm or corporation as the Purchaser in his absolute discretion may think proper to employ and for the purpose aforesaid to use or authorize the use of any materials, temporary

work, Construction Plant, and stock as aforesaid, without making payment or allowance to the Contractor for the said materials other than such as may be certified in writing by the Site-In-Charge to be reasonable, and without making any payment or allowance to the Contractor for the use of the temporary said works, construction plant and stock or being liable for any loss or damage thereto, and if the Purchaser shall by reason of his taking possession of the Work or of the Work being completed by other Contractor (due account being taken of any such extra work or works which may or be omitted) then the amount of such excess shall be deducted from any money which may be due for work done by the Contractor under the Contract and not paid for.

Any deficiency shall forthwith be made good and paid to the Purchaser by the Contractor and the Purchaser shall have power to sell in such manner and for such price as he may think fit all or any of the construction plant, materials etc. constructed by or belonging to and to recoup and retain the said deficiency or any part thereof out of proceeds of the sale.

32. CONTRACTOR'S RESPONSIBILITY

i. The Contractor shall grade/level the land identified for development of the mentioned Solar power Plant along with the design, procure, manufacture (including associated purchases and/or subcontracting), install, commission and complete the Facilities, carry out the Guarantee tests with due care and diligence in accordance with the Contract along with interconnecting transmission system including Transmission Line and the AMC of the complete facilities for the period as defined under the tender document . It is contractor's responsibility to coordinate with state/central agencies in order to get any permission whatsoever, required for successful development & operation and maintenance of Plant till its desired life.

ii. Contractor confirms that it has entered into this Contract on the basis of proper examination of the data relating to the Facilities provided and assessed by himself at the site location, after proper due diligence relating to the Facilities prior to bid submission. The Contractor acknowledges that any failure to obtain or acquaint itself with all such data and information shall not

relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Scope of Work.

iii. The Contractor shall acquire, on behalf of Purchaser, in the Purchaser's name, all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located that are necessary for the setting up of the Plant & AMC under the Contract, including, but not limited to, entry permits for all imported Purchaser's Equipment (if any). In this regard, any document required from Purchaser shall be intimated at least 10 days prior to submission. Contractor has to ensure safe keeping of the documents and diligent use. It is the responsibility of the contractor to safe keep and return all the approvals, permits, licenses, certificates and other relevant document generated as a result of the setting up of project and AMC to the Purchaser.

iv. In the matter of connectivity of Plant to BBMB substation, the Purchaser will take the necessary connectivity permission, however, all the other permissions and clearances as deemed required by the State Agency/DISCOM for Bay allocation, technical/regulatory compliance for interconnection, ROW etc are to be taken by the contractor. All the required fees including statutory fees, Supervision charges etc. shall be paid / born by the contractor. Further, contractor shall also facilitate Purchaser in getting the required permissions/agreements as required for the energy accounting by State agencies/DISCOM. Bidders are advised to include any such costs in their final offer/ Price BID.

v. The Contractor shall acquire in its name all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located that are necessary for the Performance of the Contract, including, but not limited to, the right of way for the access to site and for erection of transmission lines as applicable, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of the Purchaser and that are necessary for the Performance

of the Contract.

vi. Contractor shall also seek for any exemption applicable for the project as per the orders released from GOI time to time in appropriate Formats including all the required attachments. In this regard, contractor shall be responsible to take all necessary certificates as a proof of exemptions on behalf of Purchaser. However, all the documents required from Purchaser, as needed for the process, will be provided by Purchaser. The demand of such documents shall be made to the Purchaser in at least 10 days advance.

vii. The Contractor shall comply with all laws in force at the place, where the Facilities are installed and where the Installation Services are carried out. The laws will include all national, provincial, municipal labour or other laws that affect the Performance of the Contract and binding upon the Contractor. The Contractor shall indemnify and hold harmless the Purchaser from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel.

viii. Any plant, material, spares & spares inventory and services that will be incorporated in or be required for the facilities.

ix. Unless otherwise specified in the Contract or agreed upon by the Purchaser and the Contractor, the Contractor shall provide/ deploy sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, spares, other materials and facilities; and shall perform all work and services of whatsoever nature, to properly carry out Pre-commissioning, Commissioning and Guarantee Tests, all in accordance with the provisions of “Scope of Works and Supply by the Purchaser” to the Contract Agreement at or before the time specified in the program furnished by the Contractor and in the manner thereupon specified or as otherwise agreed upon by the Purchaser and the Contractor.

33. OTHER AGENCIES AT SITE

The Contractor shall have to execute the Work in such place and conditions where other agencies may also be engaged for other works such as site grading, filling, and levelling, electrical and mechanical engineering works, etc. No claim shall be entertained due to Work being executed in the above circumstances. The Contractor shall allow such agencies to use the facilities like roads, etc. constructed by the Contractor in order that they are able to carry out their respective scope of works unhindered.

34. NOTICE

i. TO THE CONTRACTOR

Any notice hereunder may be served on the Contractor or his duly authorized representative at thejob site or may be served.

Any communication sent shall be confirmed within two (2) days after receipt. Any communication sent by facsimile or e-mail shall be deemed to have been delivered on date of its dispatch and personal delivery deemed to have been delivered on date of delivery. Either party may change its postal, cable, telex, facsimile or e-mail address or addresses for receipt of such notices by ten (10)days' notice to the other party in writing.

ii. TO THE BBMB

Any notice to be given to the Purchaser under the terms of the Contractor shall be served bysending the same by mail to or delivering the same at the offices of Purchaser at the mentioned address in the Tender document.

35. RIGHT OF VARIOUS INTERESTS

i) The Purchaser reserves the right to distribute the work between more than one agency(ies). The Contractor shall cooperate and afford other agency(ies) reasonable opportunity for access to the Work for the carriage and storage of materials and execution of their works.

ii) Wherever the work being done by any department of the BBMB or by other agency(ies)employed by the BBMB is contingent upon Work covered by this Contract, the respective rights of the various interests involved shall be determined jointly to secure the completion of the various portions of the work in general harmony.

36. PATENTS AND ROYALTIES

i. The copyright in all drawings, documents and other materials containing data and information furnished to the Purchaser by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Purchaser directly or through the Contractor by any third party, including Bidders of materials, the copyright in such materials shall remain vested in such third party. The Purchaser shall however be free to reproduce all drawings, documents, specification and other material furnished to the Purchaser for the purpose of the contract including, if required, for maintenance of the facilities.

The Contractor shall indemnify the Purchaser against third party claims of infringement of patent, trademark or industrial design rights arising from use of goods or any part thereof in India.

The Contractor, if licensed under any patent covering equipment, machinery, materials or compositions of matter to be used or supplied or methods and process to be practiced or employed in the performance of this Contract, agrees to pay all royalties and license fees which may be due with respect thereto. If any equipment, machinery, materials, composition of matters, be used or supplied or methods and processes to be practiced or employed in the performance of this Contract, is covered by a patent under which the Contractor is not licensed then the Contractor before supplying or using the equipment, machinery materials, composition method or processes shall obtain such licenses and pay such royalties and license fees as may be necessary for performance of this Contract. In the event the Contractor fails to pay any such royalty or obtain any such license, any suit for infringement of such patents which is brought against the Contractor or the Purchaser as a result such failure will be defended by the Contractor at his own expense and the Contractor will pay any damages and costs awarded in such suit. The Contractor shall promptly notify the Purchaser if the Contractor has acquired the knowledge of any plant under which a suit for infringement could be reasonably brought because of the use by the Purchaser of any equipment, machinery, materials, process, methods to be supplied hereunder. The Contractor agrees to and does hereby grant to Purchaser, together with the right to extend the same to any of the

subsidiaries of the Purchaser as irrevocable, royalty free license to use in any country, any invention made by the Contractor or his employee in or as result of the performance ofthe Work under the Contract.

ii. All charges on account of royalty, tollage, rent or any other levy on materials obtained for the work or temporary work or part thereof (excluding materials provided by the Purchaser, if any) shall be borne by the Contractor.

iii. The Contractor shall not sell or otherwise dispose of or remove except for the purpose of this Contract, the sand, stone, clay, ballast, earth, rock or other substances, or materials obtained from any excavation made for the purpose of the Work or any building or produce upon the site at the time of delivery of the possession thereof, but all such substances, materials, buildings and produce shall be the property of the Purchaser provided that the Contractor use the same for the purpose of the work.

iv. The copyright in all drawings, documents and other materials containing data and information furnished to the Purchaser by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Purchaser directly or through the Contractor by any third party, including Bidders of materials, the copyright in such materials shall remain vested in such third party. The Purchaser shall however be free to reproduce all drawings, documents, specification and other material furnished to the Purchaser for the purpose of the contract including, if required, for operation and maintenance of the facilities.

v. The Purchaser and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract.

Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Purchaser to the extent required for the Subcontractor(s) to

perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this clause.

vi. The Purchaser shall not use such documents, data and other information received from the Contractor for any purpose other than the operation and maintenance of the Facilities. Similarly, the Contractor shall not use such documents, data and other information received from the Purchaser for any purpose other than the design, procurement of Plant and Equipment, construction or such other work and services as are required for the Performance of the Contract.

The obligation of a party under GCC Sub-Clauses 36(v) and 36(vi) above, however, shall not apply to that information which

a) Now or hereafter becomes available in the public domain through no fault of that party.
b) Can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party hereto.
c) Otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.
d) The above provisions of this Clause shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof.
e) The provisions of this clause shall survive termination, for whatever reason, of the Contract.

37. LIENS

i. If, at any time there should be evidence or any lien or claim for which the Purchaser might have become liable and which is chargeable to the Contractor, the Purchaser shall have the right to retain out of any payment then due or thereafter to become due an amount sufficient to completely indemnify the Purchaser against such lien or claim and if such lien or claim be valid, the Purchaser may pay and discharge the same and deduct the amount so paid from any money which may be or may become due and payable to

the Contractor. If any lien or claim remain unsettled after all payments are made, the Contractor shall refund or pay to the Purchaser all money that the latter may be compelled to pay in discharging such lien or claim including all costs and reasonable expenses. Purchaser reserves the right to do the same.

ii. The Purchaser shall have lien on all materials, equipment including those brought by the contractor for the purpose of erection, testing and commissioning of the Work.

iii. The final payment shall not become due until the Contractor delivers the complete release or waiver of all liens arising or which may arise out of his agreement or receipt in full or certification by the Contractor that all invoices for labour, materials, services have been paid in lien thereof and if required in any case an affidavit that so far as the Contractor has knowledge or information the releases and receipts include all the labour and material for which a lien could be filled.

iv. Contractor will indemnify and hold the BBMB harmless, for a period of 02 (Two) years after the issue of Final Acceptance from all liens and other encumbrances against the BBMB on account of debts or claims alleged to be due from the Contractor or his Sub-Contractor to any person including Sub-Contractor and on behalf of BBMB will defend at his own expense, any claim or litigation brought against the BBMB or the Contractor in connection therewith. Contractor shall defend or contest at his own expense any fresh claim or litigation by any person including his Sub-Contractor, till its satisfactory settlement even after the expiry of 02 (Two) years from the date of issue of Final Acceptance.

38. DELAYS BY PURCHASER OR HIS AUTHORIZED REPRESENTATIVES

i. In case the Contractor's performance is delayed due to any act or omission on the part of the Purchaser or his authorized representatives, then the Contractor may be given due extension of time for the completion of the Work after proper due diligence by Purchaser, to the extent such omission on the part of the Purchaser has caused delay in the Contractor's performance of his

Work.

ii. No adjustment in Contract Price shall be allowed for reasons of such delays and extensions granted except as provided in Tender Document, where the Purchaser reserves the right to seek indulgence of Contractor to maintain the agreed Time Schedule of Completion. In such an event the Contractor shall be obliged for working by Contractor's personnel for additional time beyond stipulated working hours as also Sundays and Holidays and achieve the completion date/interim targets.

39. PAYMENT IF THE CONTRACT IS TERMINATED

i. If the Contract shall be terminated as per the provisions of the Tender/ Contract, the Contractor shall be paid by the Purchaser in so far as such amounts or items shall not have already been covered by payments of amounts made to the Contractor for the Work executed prior to the date of termination at the cost provided for in the Contract and in addition to the following:

   a) The amount payable in respect of any preliminary items, so far as the Work or service comprised therein has been carried out or performed and an appropriate portion as certified by Site-in- Charge of any such items or service comprised in which has been partially carried out or performed.

   b) Any other expenses which the Contractor has expended for performing the Work under the Contract subject to being duly recommended by Site-In-Charge and approved by Purchaser for payment, based on documentary evidence of his having incurred such expenses.

ii. The Contractor will be further required to transfer the title, Guarantee/Warrantee of the Material/Products/Spares of the works & Projects including but not limited to PV Modules, Power Conditioning Units (PCU)/ Inverters, Transformers, Batteries (If applicable) etc and provide the following in the manner and as directed by the Purchaser.

   a) Any and all completed works.

   b) Such partially completed Work including drawings, information and Contract rights as the Contractor has specially performed, produced or acquired for the performance of the Contractor.

40. NO WAIVER OF RIGHTS

Neither the inspection by the purchaser nor any order by the purchaser for payment of money or any payment for or acceptance of the whole or any part of the Work by the purchaser nor any extension of time, nor any possession taken by Purchaser shall operate as a waiver of any provision of the Contract, or of any power herein reserved to the purchaser, or any right to damages herein provided, nor shall any waiver of any breach in the Contract be held to be a waiver of any other subsequent breach.

41. CERTIFICATE NOT TO AFFECT RIGHT OF PURCHASER AND LIABILITY OF CONTRACTOR

No interim payment certificate(s) issued by the Purchaser, nor any sum paid on account by the Purchaser, nor any extension of time for execution of the work granted by Purchaser shall affect or prejudice the rights of the Purchaser against the Contractor or relieve the Contractor of his obligations for the due performance of the Contract, or be interpreted as approval of the Work done or of the equipment supplied and no certificate shall create liability for the Purchaser to pay for alterations, amendments, variations or additional works not ordered, in writing, by Purchaser or discharge the liability of the Contractor for the payment of damages whether due, ascertained, or certified or not or any sum against the payment of which he is bound to indemnify the Purchaser.

42. LANGUAGE AND MEASURES

All documents pertaining to the Contract including Specifications, Schedules, Notices, Correspondence, Operating and Maintenance Instructions, Drawings or any other writing shall be written in English language only. The SI System of measurement shall be used in the Contract unless otherwise specified. Any literature/standard required for the execution of the project work will be provided by the contractor in the English language only.

43. GUARANTEE TESTS & OPERATIONAL ACCEPTANCE AND TRANSFER OF TITLE

43.1 FUNCTIONAL GUARANTEES

i. The Contractor guarantees that during the Guarantee Test, the Facilities and all parts thereof shall attain the Functional Guarantees specified under

Technical Specifications, subject to and upon the conditions therein specified. Respective compensation in case of the non-achievement of the same is mentioned in the SCC of the tender document.

ii. If, for reasons attributable to the Contractor, the guaranteed level of the Functional Guarantees specified under Technical Specifications are not met either in whole or in part, the Contractor shall, within a mutually agreed time, at its cost and expense make such changes, modifications and/ or additions to the Plant or any part thereof as may be necessary to meet such Guarantees. The Contractor shall notify the Purchaser upon completion of the necessary changes, modifications and/or additions, and shall seek the Purchaser's consent to repeat the Guarantee Test. If the level of the specified Functional Guarantee parameters, as demonstrated even during repeat of the Guarantee Test(s), are outside the acceptable shortfall limit, the Purchaser may at its option, either

a) Reject the Equipment and advise immediate replacement to suit the provisions of Technical Specification without any additional cost or;
b) Reject the Equipment and recover the payments already made, or;
c) Terminate the Contract and recover the payments already made, or;
d) Accept the equipment after levy of liquidated damages in accordance with the provisions specified.

43.2 PLANT PERFORMANCE GUARANTEE TEST

The Plant Performance Guarantee (as mentioned in TS) Test shall be conducted by the Contractor after Commissioning of the Facilities to ascertain whether the Facilities or the relevant part(s) can attain the Functional Guarantees specified in the Contract Documents. The Contractor's and Site-in-charge shall attend the Guarantee Test. The detailed procedure for Performance Guarantee Test shall be carried out as per procedure laid down in Technical Specifications.

43.3 OPERATIONAL ACCEPTANCE

i. Operational Acceptance shall occur in respect of the Facilities when:
   a) The Plant Performance Guarantee in accordance with the procedure specified in "Technical Specifications" has been successfully completed

and the Functional Guarantees are met.

b) Completion of the Facilities have been achieved as per Technical Specifications.

ii. The milestone payment linked with successful Operational acceptance shall be released subjected to following:

a) All “As- Built” Drawings and documents are submitted.

b) Detailed Engineering Document with detailed specification, schematic drawing, circuit drawing, cable routing plans and test results, manuals for all deliverable items, Operation, Maintenance & Safety Instruction Manual and other information about the project are submitted.

c) Bill of material of the installed Facility is submitted.

d) Mandatory spares including special tools and tackles at project Site are provided.

e) All the required approvals and NOC’s as required, are submitted.

f) List of deviation from the approved drawings with reason for deviation is submitted.

g) List of punch points, duly signed, is provided.

h) Settlement of liquidity damages against delay and performance (Liquidity Damages).

i) Certificates of final levels as set out for various works.

j) Certificates of tests performed for various Works.

k) Material appropriation, Statement for the materials issued by the Purchaser, if applicable for the work and list of surplus materials returned to the Purchaser’s store duly supported by necessary documents(as applicable).

iii. At any time after the events set out in GCC Sub-Clause 43.3(i) have occurred, the Contractor may give a notice to the site-in-charge requesting the issue of an Operational Acceptance Certificate in the form acceptable to the Purchaser in respect of the Facilities or the part thereof specified in such notice as at the date of such notice.

iv. The site-in-charge within thirty (30) days after receipt of the Contractor’s notice, issue an Operational Acceptance or has to inform the Contractor in writing of the justifiable reasons why the Operational Acceptance has not

issued,

v. The start date of the AMC shall be reckoned from the date mentioned in the Operational Acceptance Certificate.

43.4 FINAL ACCEPTANCE

i. Final Acceptance shall occur in respect of the Facilities when:
   a) The plant has achieved the Operational acceptance; and
   b) Handing over – Taking over should have been completed; and
   c) Successful demonstration of the annual performance guarantees
   d) The Contractor has paid the liquidated damages, if any, as specified in SCC thereto;
   e) Account reconciliation and NCR/ Punch list closure.

ii. At any time after the events set out in GCC Sub – Clause 43.4(i) have occurred, the Contractor may give a notice to the site-in-charge requesting the issue of Final Acceptance in the form acceptable to the site-in-charge in respect of the Facilities or the part thereof specified in such notice as at the date of such notice.

iii. The site-in-charge within thirty (30) days after receipt of the Contractor's notice, issue Final Acceptance or has to inform the Contractor in writing of the justifiable reasons why the Operational Acceptance has not issued

iv. The AMC period may further be extended for a period as defined in contract agreement at the sole discretionary of BBMB, as per the scope given in the Tender documents and on same terms and conditions and rates as per Schedule of Rates for AMC (SOR-3). In case the Purchaser wishes to extend the AMC period beyond the agreed period under this contract, he shall intimate contractor at least 6 months prior to the completion period.

44. RELEASE OF CONFIDENTIAL INFORMATION

i. The Contractor shall not communicate or use in advertising, publicity, sales releases or in any other medium, photographs, or other reproduction of the Work under this Contract or description of the site dimensions, quantity,

quality or other information, concerning the Work unless prior written permission has been obtained from the PURCHASER.

ii. The Purchaser and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Purchaser to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor.

iii. The Purchaser shall not use such documents, data and other information received from the Contractor for any purpose other than the operation and maintenance of the Facilities. Similarly, the Contractor shall not use such documents, data and other information received from the Purchaser for any purpose other than the design, procurement of Plant and Equipment, construction or such other work and services as are required for the Performance of the Contract.

iv. The obligation of a party above, however, shall not apply to that information which:

a) Now or hereafter enters the public domain through no fault of that party
b) Can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party hereto.
c) Otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

v. The above provisions of this GCC shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof.

vi. The provisions of this GCC Clause 44 shall survive termination, for whatever reason, of the Contract.

45. ANNUAL MAINTENANCE

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

45.2 PREVENTIVE / ROUTINE MAINTENANCE:

This shall be done by the Contractor regularly and shall include activities such as cleaning and checking the health of the Solar PV system, cleaning of module surface, tightening of all electrical connections, and any other activity including the associated civil works, as mentioned in TS, wear and tear that may be required for proper functioning of the Solar PV system as a whole. Necessary maintenance activities, Preventive and Routine for Transformers and associated switch gears and transmission line also shall be included.

Soil treatment against termite and anti-weeding, clearing bushes in the solar field etc., as per the direction of Purchaser's/Site- In-charge.

45.3 BREAKDOWN / CORRECTIVE MAINTENANCE:

Whenever a fault occurs, the Contractor has to attend to rectify the fault & the fault must be rectified within the 48 hours from the time of occurrence of fault. The contractor must maintain all the records pertaining to all such faults and necessary measures taken.

The date of AMC period shall begin from the date of Operational acceptance. However, operation of the Power Plant means operation of system as per TS and workmanship in order to keep the project trouble free covering the AMC period. The contractor must demonstrate the committed CUF at the end of every year in accordance with commitment made in line with the Performance guarantees.

45.4 SERVICEABILITY LEVEL AGREEMENT (SLA)

45.4.1 Contractor shall make efforts to maintain 100% serviceability of complete Plant including all other associated infrastructure developed by the Contractor during execution of project as its scope of work & the respective report of the same shall be submitted to the Purchaser.

45.4.2 Contractor shall maintain a Complaint log book, which shall include the timing of logging of complaint including unique Complaint number, time of closure of complaint & it's Root Cause Analysis.

45.4.3 Any complaint related to unserviceability/improper functioning of any & all component of the plant including but not limited to PV Module, PCU, Transformers, switchgears, SCADA, roads, drainage, water supply lighting system, office infrastructure, CCTV system should be immediately attended & rectified. If such complaint is not rectified within 48 hours from logging of complaint, Purchaser may choose to rectify the same through any other agency at the risk of Contractor and Purchaser shall recover 110% of such cost incurred from subsequent payment to the contractor.

45.4.4 Such rectification work carried out by Purchaser doesn't exempts/relieves Contractor from its responsibility towards subsequent maintenance, repair & replacement of such component/ infrastructure of the Plant or meeting the performance parameters of the Plant.

45.4.5 AMC Routine & Manpower: Contractor shall provide Preventive / Routine Maintenance schedule based on Original Equipment manufacturer and good engineering practices. The team deployed for the AMC must have the sufficient experience of executing the similar tasks.

However, contractor shall engage additional manpower as and when need arise.

45.5 Bidder is requested to provide the list of all the spares required to maintain the facility for AMC period. Contractor agrees to supply such spare parts, as recommended or otherwise required for the effective and hassle-free operation and maintenance of the Facilities. However, the contractor, with its previous experience, is to provide a list of spares including specifications, Bidder details

and indicative price, as recommended by him and OEM. The contractor shall keep and maintain the inventory of such spares for the hassle-free operation during the complete AMC period without additional cost to Purchaser. Also, at the end of penultimate year of the AMC contract, contractor shall supply a list of all recommended spares as per the operational requirement of the plant and with reference to the mean time between failures (MTBF), along with detailed specifications, Bidder details and tentative cost for future purchase. The price of such spare parts shall include the breakup of taxes and duties as applicable towards purchase and supply of spare parts. Purchaser, at its discretion, will purchase the spare as required for future operation. However, the contractor shall replenish the mandatory spares at his cost prior to the closure of the AMC period.

46. COMPLETION OF CONTRACT

Unless otherwise terminated under the provisions of any other relevant clause, this Contract shall be deemed to have been completed at the expiration of the Period of Liability/ Validity of the Contract as provided under Section - V, Special Conditions of Contract (SCC).

47. PRE - COMMISSIONING & COMMISSIONING

i. As soon as installation of the Facilities has, in the opinion of the Contractor, been completed as specified in the Technical Specifications, excluding items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the Site-in-charge in writing to witness the pre-commissioning of the facility.

ii. If the Site-in-charge is satisfied that the Facilities have reached Completion, the Site-in-charge shall, within seven (7) days after receipt of the Contractor's notice, arrange to witness the pre – commissioning of the Facilities.

iii. If the Site-in-charge notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies and shall repeat the procedure described in GCC Sub- Clause 47(i).

iv. If the Site-in-charge is still not so satisfied, then it shall notify the Contractor in writing of any defects and/or deficiencies within seven (7) days after receipt of the Contractor's repeat notice, and the above procedure shall be repeated.

v. As soon as all works in respect of Pre-commissioning are completed and, in the opinion of the Contractor, the Facilities are ready for Commissioning, the Contractor shall so notify the Site-in-charge in writing. The Contractor shall commence Commissioning of the facilities as per the GCC Sub – Clause 47(vi).

vi. Commissioning of the Facilities shall be completed by the Contractor as per procedures detailed in the Technical Specifications and in the presence of the Site-in-charge.

vii. As soon as possible after Commissioning, the Contractor shall complete all outstanding minor itemsso that the Facilities are fully in accordance with the requirements of the Contract, failing which the Employer will undertake such completion and deduct the costs thereof from any monies owing to the Contractor.

viii. As soon as possible after Commissioning, the Contractor shall make the facility ready for the performance test (PR test) and inform the Site-in-charge at least 7 (seven) days prior to the start of the performance test as per the procedure mentioned in the Technical Specifications.

ix. Upon successful Operational Acceptance of the Facilities as per GCC sub clause 43.3, the Contractor shall be responsible for maintenance of the whole facility as per agreement and as per the agreed duration of comprehensive annual maintenance as stipulated and mutually agreed terms and conditions.

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[E] PERFORMANCE OF WORK

48. EXECUTION OF WORK

i. All the Works shall be executed in strict conformity with the provisions of the Contract Documents and with such explanatory detailed drawings, specification and instructions as may be furnished from time to time by the Contractor whether mentioned in the Contract or not. The Contractor shall be responsible for ensuring that works throughout are executed in the most substantial, proper and workman like manner with the quality of material and workmanship in strict accordance with the Specifications. The Contractor shall provide all necessary materials, equipment, labour etc. for execution of Work till completion unless otherwise mentioned in the Contract.

ii. All materials shall be of the best quality and workmanship capable of satisfactory operation under the operating and climatic conditions as may be specified. Unless otherwise specified, they shall conform in all respect to the latest edition of the relevant IS codes specification wherever Indian specifications apply or IEC codes or equivalent internationally accepted standard.

iii. The Contractor shall supply & deliver all equipment and materials for installation at site. The Contractor shall arrange for transportation, loading & unloading and safe storage of materials at project site at his own cost & risk.

iv. If the Contractor offers equipment manufactured in accordance with other international well recognized standards (mentioned above), he shall, in that case, supply a copy in English of the Standard Specification adopted and shall clearly mention in what respect such standard specification differs from Indian Standard Specifications. The Plant, equipment, and materials offered by the Contractor should comply with one consistent set of Standards only to make the system compatible and work in harmony as far as possible, except if mentioned otherwise.

49. WORK IN MONSOON AND DEWATERING

i. Unless otherwise specified elsewhere in the tender, the execution of the Work may entail working in the monsoon also. The Contractor must maintain

a minimum labour force as may be required forthe job and plan and execute the construction and erection according to the prescribed schedule. No extra rate will be considered for such work in monsoon.

ii. During monsoon and other period, it shall be the responsibility of the Contractor to keep the construction work site free from water at his own cost.

50. CHANGE IN LAWS AND REGULATIONS

If, after the date seven (7) days prior to the date of Bid submission, in the country where the Site islocated, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the Performance of any of its obligations under the Contract. Contractor shall promptly and within 15 days of such enactment coming into force, forward relevant supporting documents to Purchaser.

However, these adjustments would be restricted to direct transactions between the Purchaser and the Contractor. This adjustment shall not be applicable on procurement of raw materials, intermediary components and intermediary services etc. by the Contractor and shall also not be applicable on bought out items dispatched directly from sub-vendor works to site.

Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable.

A) Statutory variations during original contractual completion period :

i) If any increase takes place in taxes and duties due to statutory variation, then BBMB shall admit the same on production of documentary evidences.

ii) If any decrease takes place in taxes and duties due to statutory variation, the same shall be passed on to BBMB or BBMB shall admit the decreased rate of taxes and duties while making the payment.

B) Statutory variations beyond original contractual completion period:

i) If reasons for extension of contractual completion period are attributable solely to BBMB, the provisions of (A) (i) & (ii) above shall apply.

ii) If reasons for extension of contractual completion period is attributable to Bidder, then;

a) Any increase takes place in taxes & duties due to statutory variation, then BBMB shall not admit the same; however BBMB shall admit the taxes & duties at the rate prevailing during payment of last invoice raised during original contract completion period.

b) If any decrease takes place in taxes and duties due to statutory variation, the same shall be passed on to BBMB or BBMB shall admit the decreased rate of taxes and duties while making the payment.

c) Variation on account of exchange rate will not be payable. No statutory variation shall be payable by BBMB on the input items. i.e., raw materials etc.

The term Change in Law shall refer to the occurrence of any of the following events pertaining to this project only after the date seven (7) days prior to the date of Bid submission, including (i) the enactment of any new law; or (ii) an amendment, modification or repeal of an existing law; or (iii) any change in the rates of any Taxes including any duties and cess or introduction of any new tax made applicable for setting up the project.

However, Change in Law shall not include (i) any change in taxes on corporate income or (ii) any change in any withholding tax on income or dividends distributed to the shareholders of the Contractor, or (iii) any change on account of regulatory measures by the Appropriate Commission.

51. GENERAL CONDITIONS FOR CONSTRUCTION AND ERECTION WORK

i) Overtime work is permitted in cases of need and the Purchaser will not compensate the same. Shift working at 2 or 3 shifts per day may become necessary and the Contractor should take this aspect into consideration for formulating his rates. No extra claims will be entertained by the Purchaser on this account.

ii) The Contractor must arrange for the placement of workers in such a way that the delayed completion of the Work or any part thereof for any reason whatsoever will not affect their proper employment. The Purchaser will not entertain any claim for idle time payment whatsoever.

iii) The Contractor shall submit to the Purchaser reports at regular intervals regarding the state and progress of Work. The details and proforma of the report will mutually be agreed after the award of Contract. The Contractor shall provide display boards showing progress and labour strengths at worksite.

52. DESIGN AND ENGINEERING

Contractor shall submit the Detailed Project Report (DPR) along with detailed Bill of Quantities (BOQ's), make/manufacture & model of all the equipment's within 45 days from the date of LOA and get approved from Purchaser.

i. The Work covered under this Contract having to be executed by the Contractor on a lump-sum firm price quoted by him, the Purchaser will not accept any proposals for changes in Value of Contract or extension in time on account of any such changes which may arise to the Contractor's scope of Work as a result of detailed Engineering and thereafter during the execution of Work.

ii. SPECIFICATIONS AND DRAWINGS

a) The Contractor shall execute the basic and detailed design and engineering work in compliance with the provisions of the Contract, or where not so specified, in accordance with good and sound engineering practice.

b) The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents that it has prepared, whether such specifications, drawings and other documents have been approved by the Site-in-charge or not, provided that such discrepancies, errors or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the site-in-charge/Purchaser.

iii. CODES AND STANDARDS

a) Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date of bid submission shall apply unless otherwise specified.

b) Approval / Review of Technical Documents by Purchaser/Site-in-charge. The Contractor shall prepare list of documents and drawings i.e. Master drawing list (MDL) as per technical specifications and furnish to the Site-in-charge/Purchaser for review & Approval of the same within 45 days from the date of LOA.

c) Within Forty Five (45) days after receipt by the Site-in-charge/Purchaser of any document requiring the Site-in-charge/Purchaser's approval, the Site-in-charge/Purchaser shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the Contractor in writing of its disapproval thereof and the reasons therefor and the modifications that the Site-in-charge/Purchaser proposes.

d) The Site-in-charge/Purchaser shall not disapprove any document, except on the grounds that the document does not comply with some specified provision of the Contract or that it is contrary to good engineering practice.

e) If the Site-in-charge/Purchaser disapproves the document, the Contractor shall modify the document and resubmit it for the Site-in-charge/Purchaser approval. If the Site-in-charge/Purchaser approves the document subject to modification(s), the Contractor shall make the required modification(s), and upon resubmission with the required modifications the document shall be approved.

f) The procedure for submission of the documents by the Contractor and

their approval by the Site-in-charge/Purchaser shall be as per the Contract Co-ordination procedure.

g) If any dispute or difference occurs between the Site-in-charge/Purchaser and the Contractor in connection with or arising out of the disapproval by the Site-in-charge/Purchaser of any document and/or any modification(s) thereto that cannot be settled between the parties within a reasonable period, then such dispute or difference may be settled in accordance with GCC Clause (Settlement of Dispute) hereof. If such dispute or difference is referred as per GCC clause, the Site-in-charge/Purchaser shall give instructions as to whether and if so, how, Performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Site-in-charge/Purchaser instructions, provided that if the Arbitration upholds the Contractor's view on the dispute, then the Contractor shall be reimbursed by the Purchaser for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Arbitration shall decide, and the Time for Completion shall be extended accordingly.

h) The Site-in-charge/Purchaser approval, with or without modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Site-in-charge/Purchaser.

i) The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Site-in-charge/Purchaser an amended document and obtained the Site-in-charge/Purchaser approval thereof, pursuant to the provisions of this GCC Clause.

j) If the Site-in-charge/Purchaser requests any change in any already approved document and/or in any document based thereon, generally shall be taken care by the contractor if the change is not causing any major financial impact.

53. DRAWINGS TO BE SUPPLIED BY THE PURCHASER

i. The drawings attached with tender, if any, are only for the general guidance

to the Contractor to enable him to visualize the type of work contemplated and scope of work involved. The Contractor will be deemed to have studied the Drawings and formed an idea about the Work involved.

ii. The Contractor shall be deemed to have gone through the Drawings supplied to him thoroughly and carefully and in conjunction with all other connected drawings and bring to the notice of the site-in-charge discrepancies, if any, therein before actually carrying out the Work.

iii. Copies of all detailed working drawings relating to the Work shall be kept at the Contractor's office on the site and shall be made available to the Site-In-Charge at any time during the Contract. The drawings and other documents issued by the Site-In-Charge/Purchaser shall be returned to the Site-In-Charge/Purchaser on completion of the Work.

54. DRAWINGS TO BE SUPPLIED BY THE CONTRACTOR

i. The drawings/ data which are to be furnished by the Contractor shall be furnished within the specified time.

ii. Where approval/ review of drawings before manufacture/ construction/ fabrication has been specified, it shall be Contractor's responsibility to have these drawings prepared as per the TS and got it approved before proceeding with manufacture/ construction/ fabrication as the case may be. Any change that may have become necessary in these drawings during the execution of the work shall have to be carried out by the Contractor at no extra cost. All as built drawings shall bear the certification stamp duly signed by both the Contractor and Site-In-Charge/Purchaser. The Contractor shall incorporate any modifications and/ or corrections as highlighted/notified and submit the drawings for approval practically within the next 7 working days

iii. The Drawings submitted by the Contractor shall be reviewed by the Site-In-Charge/Purchaser as far as practicable within 45 (Forty Five) days. The Contractor shall incorporate any modifications and/ or corrections as highlighted/notified and submit the drawings for approval. Any delays arising out of failure by the Contractor to rectify the drawing in good time shall not

alter the Contract Completion Time.

iv. All GA & GFC drawings shall be provided in soft as well as hard form in appropriate format/size to Site-In-Charge/Purchaser for review & approval. All as built drawings showing all corrections, adjustments & deviations, if any, etc shall be furnished by the Contractor in 04 (Four) Hard Copies and 02 (Two) Soft Copy for record purposed to the Site-In-Charge/Purchaser immediately after the operational acceptance.

55. SETTING OUT WORKS

i. The Contractor shall provide, fix and be responsible for the maintenance of all stakes, templates, level marks, profiles and other similar things and shall take all necessary precautions to prevent their removal or disturbance and shall be responsible for the consequence of such removal or disturbance should the same take place and for their efficient and timely reinstatement. The Contractor shall also be responsible for the maintenance of all existing survey marks, boundary marks, distance marks and center line marks, either existing or supplied and fixed by the Contractor.

ii. Before beginning the Works, the Contractor shall at his own cost, provide all necessary reference and level posts, pegs, bamboos, flags, ranging rods, strings and other materials for proper layout of the works in accordance with the schemes for bearing marks as required. The center, longitudinal or face lines and cross lines shall be marked by means of small masonry pillars. Each pillar shall have distinct mark at the center to enable theodolite to be set over it.

iii. Pillars bearing geodetic marks located at the sites of units of Works under construction should be protected and fenced by the Contractor.

iv. On completion of Work, the Contractor must submit the geodetic documents according to which the Work was carried out.

56. GEOLOGICAL DISCOVERIES

All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the site where the

services are performed, be deem to be the absolute property of the Purchaser. The Contractor shall take reasonable precautions to prevent thepersonnel or any other persons from removing or damaging any such article or thing and shall immediately upon the discovery thereof and, before removal, acquaint the Purchaser of such discoveryany carry out, at the expense of the Purchaser, the Purchaser's orders as to the disposal of the same.

57. MATERIALS TO BE SUPPLIED BY CONTRACTOR

i. PLANT AND EQUIPMENT

The Contractor shall procure and transport all the Plant and Equipment in an expeditious and orderlymanner to the Site to achieve completion of activities as per schedule to enable commissioning of the Project by the scheduled commissioning date.

ii. TRANSPORTATION

The contractor shall ensure that all the plant and equipment required to complete the Facility at site, are procured and dispatched. The Contractor shall at its own risk and expense transport all the Plantand Equipment and the Contractor's Equipment to the Site by the mode of transport that the Contractor judges most suitable under all the circumstances.

iii. PACKING AND MARKING

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

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

In order to import any items, associated with the Solar PV Power Project, from abroad or from any other state in India, Contractor shall have to arrange

any clearance, permission, if required at his own risk, from any Government (Government of State & Government of India) or any Government (Government of State & Government of India) controlled organization for transportation of materials from manufacturing shop to delivery at Site. Contractor shall take necessary insurances to ensure safe transit & consequential risks. All packing material is the property of the Purchaser and shall be immediately taken into the safe storage.

iv. STORAGE OF EQUIPMENT

The plant and equipment thus procured under the scope of the contract must be kept in safe custody till put under operation, essentially free from water contact. Contractor has to ensure the appropriate and proper storage arrangement prior to the arrival of the equipment including containers, temporary structures, sheds, platforms etc. at its own cost.

The Contractor shall procure and provide within the Value of Contract the whole of the materials required for the construction including steels, cement and other building materials, tools, tackles, construction plant and equipment for the completion and maintenance of the Work and shall make his own arrangement for procuring such materials and for the transport thereof. The Purchaser may give necessary recommendation to the respective authority if so desired by the Contractor but assumes no further responsibility of any nature. The Purchaser will insist on the procurement of materials which bear ISI stamp and/ or which are supplied by reputed Bidders.

v. The Contractor shall properly store all materials either issued to him or brought by him to the Site to prevent damages due to rain, wind, direct exposure to sun, etc. as also from theft, pilferage, etc. forproper and speedy execution of his works. The Contractor shall maintain sufficient stocks of all materials required by him.

58. STORES SUPPLIED BY THE BBMB

Purchaser, at his sole discretion and upon request from Contractor, may provide appropriate space for storage outside the site on mutually agreeable to both parties. However, the transportation of equipment from store to site shall be arranged by the contractor at his cost and risk.

59. CONDITIONS FOR ISSUE OF MATERIALS

No material will be issued to the contractor by the BBMB for this Project.

60. MATERIALS OBTAINED FROM DISMANTLING

If the Contractor in the course of execution of the Work is called upon to dismantle any part for reasons other than those stipulated in Clauses 65 and 68 hereunder, the materials obtained in the Work of dismantling etc., will be considered as the BBMB's property and will be disposed off to the best advantage of the BBMB.

61. ARTICLES OF VALUE FOUND

All gold, silver and other minerals of any description and all precious stones, coins, treasure relics, antiquities and other similar things which shall be found in, under or upon the Site, shall be the property of the BBMB and the Contractor shall duly preserve the same and shall from time to time deliver the same to such person or persons indicated by the Purchaser.

62. DISCREPANCIES BETWEEN INSTRUCTIONS

Should any discrepancy occur between the various instructions furnished to the Contractor, his representative or staff or any doubt arises as to the meaning of any such instructions or should there be any misunderstanding between the Contractor's staff and the Site-In-Charge's staff, the Contractor shall refer the matter immediately in writing to the Site-in- Charge whose decision thereon shall be final and conclusive and no claim for losses alleged to have been caused by such discrepancies between instructions, doubts, or misunderstanding shall in any event be admissible.

63. ACTION WHERE NO SPECIFICATION IS ISSUED

In case of any class of Work for which there is no Specification supplied by the Purchaser as mentioned in the Tender Documents such Work shall be carried out in accordance with Indian Standard Specifications and if the Indian Standard Specifications do not cover the same, the Work should be carried out as per standard Engineering Practice subject to the approval of the Site-In-Charge.

64. INSPECTION OF WORKS

i. The Site-In-Charge/Purchaser will have full power and authority to inspect the Work at any time wherever in progress either on the Site or at the Contractor's premises/ workshops wherever situated, premises/ workshops of any person, firm or corporation where Work in connection with the Contract may be in hand or where materials are being or are to be supplied, and the Contractor shall afford or procure for the Site-In-Charge/Purchaser every facilityand assistance to carry out such inspection. The Contractor shall, at all time during the usual working hours and at all other time at which reasonable notice of the intention of the Site-In-Charge/Purchaser or his representative to visit the Work shall have been given to the Contractor, either himself be present or receive orders and instructions, or have a responsible representative duly accredited in writing, present for the purpose. Orders given to the Contractor's representative shall be considered to have the same force as if they had been given to the Contractor himself. The Contractor shall give not less than 15 (Fifteen) day notice in writing to the Site-In-Charge/Purchaser before covering up or otherwise placing beyond reach of inspection and measurement of any work in order that the same may be inspected and measured. BBMB at his own discretion may or may not attend the scheduled inspection calls as arranged by the contractor on account of pre-occupation and other site exigencies.

   In the event of breach of above the same shall be uncovered at Contractor's expense for carrying out such measurement or inspection.

ii. No material shall be dispatched by the contractor before obtaining the approval of the Purchaser in writing.

iii. The Contractor is to provide at all time during the progress of the Work and the maintenance period,proper means of access with ladders, gangways etc. and the necessary attendance to move and adopt as directed for inspection or measurements of the Work by the Site-In-Charge.

iv. The Contractor shall make available to the Site-In-Charge/Purchaser free of cost all necessary instruments and assistance in checking or setting out of Work and in the checking of any Work made by the Contractor for the purpose of setting out and taking measurements of Work.

65. TESTS FOR QUALITY OF WORK

i. All workmanship shall be of the respective kinds described in the Contract Documents and in accordance with the instructions of the Site-In-Charge/Purchaser and shall be subjected from time to time to such test as the Site-In-Charge/Purchaser may direct at the place of manufacture or fabrication or on the site or at all or any such places.

The cost of inspection/ pre-dispatch inspection/ in-stage inspection (Exclusive of PURCHASERs representatives TA/DA) shall be borne by Contractor. Such pre-dispatch inspection(s) at the manufacturer's facility shall be carried out in the presence of the Purchaser or their authorized representatives, for such items as is specified by the Purchaser. However the expenses towards travel, boarding & lodging for the representatives of Purchaser for such inspections shall be borne by the Purchaser.

However, in case re-inspection is necessitated on account of non-acceptance of item(s) due to failure on Factory Acceptance Test(s), the expenses towards travel, boarding & lodging for the representatives of Purchaser shall be on account of the Contractor.

The Contractor shall provide assistance, instruments, labour and materials as are normally required for examining, measuring and testing any workmanship as may be selected and required by the Site-In-Charge/Purchaser or their representatives.

ii. All the tests that will be necessary in connection with the execution of the Work as decided by the Site-In-Charge/Purchaser shall be carried out at the field testing laboratory of the Purchaser by paying the charges as decided by the Purchaser from time to time. In case of non-availability of testing facility with the Purchaser, the required test shall be carried out at the cost of Contractor at Government or any other accredited testing laboratory.

iii. The PV modules/ inverters/ cables and other Balance of system equipment deployed in the solar PV power Plant shall have valid test certificates for their qualification as per above specified IEC/ IS Standards by one of the NABL Accredited /Govt approved Test Centers in India. In case of module types/

equipment for which such Test facilities may not exist in India, test certificates from reputed ILAC Member body accredited Labs abroad (with proof of accreditation) will be acceptable.

66. SAMPLES FOR APPROVAL

In case of requirement, the Contractor shall furnish to the Site-In-Charge/Purchaser for approval, when requested or if required by the specifications, adequate samples of all materials and finished to be used in the Work. Such samples shall be submitted before the Work is commenced and in ample time to permit tests and examinations thereof. All materials furnished and finishes applied in actual Work shall be fully equal to the approved samples. Cost of samples including transport shall be in bidder scope.

67. ACTION AND COMPENSATION IN CASE OF POOR/NON-COMPLIANT WORK

If it shall appear to the Site-In-Charge that any work has been executed with unsound, imperfect or unskilled workmanship, or with materials of any inferior description, or that any materials or articles provided by the Contractor for the execution of the Work are unsound, or of a quality inferior to that contracted for, or otherwise not in accordance with the Contract, the Contractor shall on demand in writing from the Site-In-Charge or his authorized representative specifying the Work, materials or articles complained of notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify or remove and reconstruct the Work so specified and provide other proper and suitable materials or articles at his own cost. In the case of any such failure the Site-In-Charge may on expiry of notice period rectify or remove and re-execute the Work or remove and replaced with others, the materials or articles complained of to as the case may be at the risk and expense in all respects of the Contractor. The decision of the Site-In-Charge as to any question arising under this clause shall be final and conclusive.

68. SUSPENSION OF WORKS

The contractor shall, if ordered in writing by the Site-in-Charge or his representative temporarily suspend the works or any part thereof for such period and such time as so ordered and shall not, after receiving such written

order, proceed with the work therein ordered to be suspended, until he shall have received a written order to proceed therewith. The contractor shall not be entitled to claim / compensation for any loss or damage sustained by him by reason of temporary suspension of the works aforesaid. However, suitable time extension may be considered at the sole discretion of the BBMB.

An extension of time for completion corresponding with the delay caused by any such suspension of the works as aforesaid will be granted to the contractor, should he applies for the same, provided that suspension was not consequent to any default or failure on the part of the contractor.

69. BBMB MAY DO PART OF WORK

Upon failure of the Contractor to comply with any instructions given in accordance with the provisions of this Contract the Purchaser has the alternative right, instead of assuming charge of entire Work, to place additional labour force, tools, equipment and materials on such parts of the Work, as the Purchaser may designate or also engage another Contractor to carry out the Work. In such cases, the Purchaser shall deduct from the amount which otherwise might become due to the Contractor, the cost of such work and material with 110% (Hundred & Ten Percent) of the actual cost of works and materials.

70. POSSESSION PRIOR TO COMPLETION

No part commissioning allowed, Purchase shall take possession of the whole facility.

71. DEFECTS LIABILITY PERIOD

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

i. The Contractor must warrant that the Facilities shall be free from defects in the design, engineering, materials and workmanship of the Plant and Equipment supplied and of the work executed.

ii. If it shall appear to the Site-in-charge that any supplies have been executed with unsound, imperfect or unskilled workmanship, or with materials of any

inferior description, or that any materials or articles provided by the Contractor for the execution of Contractor are unsound or otherwise not in accordance with the Contract, the Contractor shall on demand in writing inform the Site-in-charge or its authorized representative specifying the item, materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for. The Contractor shall forthwith rectify or remove and replace that item so specified and provide other proper and suitable materials or articles at its own charge and cost, and in the event of failure to doso within a period to be specified by the Site-in-charge in its demand aforesaid, the Site-in-charge may on expiry of notice period rectify or remove and re-execute the time or remove and replace with others, the materials or articles complained of as the case may be at the risk and expense in all respects of the Contractor. The decisions of the Site-in-charge in this regard shallbe final and binding.

iii. The Contractor shall also be undertaking the maintenance of the Facility and consequently shall be required to rectify any defects that emerge during the maintenance of the Facilities for the entire term of this Contract.

iv. The Defect Liability Period shall be of Twelve (12) months from the date of Operation Acceptance, during which the Contractor must repair any defect identified by the Site-in-charge after commissioning of the Plant. All the expenses to repair the defects shall be borne by the contractor and no additional cost charged to the Purchaser.

v. If during the Defect Liability Period any defect found in the design, engineering, materials and workmanship of the Plant and Equipment supplied or of the work executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Purchaser regarding appropriate remedying of the defects, and at its cost, repair, replace or otherwise make good (as the Contractor shall, at its discretion, determine) such defect as well as any damage to the Facilities caused by such defect.

vi. Furthermore, without prejudice to the generality of the foregoing, it is clarified that the Contractor shall also be responsible for the repair,

replacement or making good of any defect, or of any damage to the Facilities arising out of or resulting from any of the following causes:

- Improper maintenance of the Facilities by the Contractor during maintenance of the Facility and
- Maintenance of the Facilities outside specifications of the Facilities.

vii. The Contractor may, with the consent of the Purchaser, remove any Plant and Equipment or any part of the Facilities that are defective from the Site, if the nature of the defect and/or any damage to the Facilities caused by the defect is such that repairs cannot be expeditiously carried out at the Site.

viii. If the repair, replacement or making good is of such a nature that it may affect the efficiency of the Facilities or any part thereof, the Purchaser may give to the Contractor a notice requiring that tests of the defective part of the Facilities shall be made by the Contractor immediately upon completion of such remedial work, whereupon the Contractor shall carry out such test.

ix. If such part fails the tests, the Contractor shall carry out further repair, replacement or making good (as the case may be) until that part of the Facilities passes such tests. The tests, in character, shall in any case be not inferior to what has already been agreed upon by the Owner and the Contractor for the original equipment/part of the Facilities.

x. If the Contractor fails to commence the work necessary to remedy such defect or any damage to the Facilities caused by such defect within a reasonable time (which shall in no event be considered to be less than seven (7) days), the Purchaser may, following a notice to the Contractor, proceed to do such work, and the costs incurred by the Purchaser in connection therewith shall be paid to the Purchaser by the Contractor or may be deducted by the Purchaser from any monies due to the Contractor or claimed under the Performance Guarantee, without prejudice to other rights, which the Purchaser may have against the Contractor in respect of such defects.

xi. If the Facilities or any part thereof cannot be used by reason of such defect

and/or making good of such defect, the Defect Liability Period of the Facilities or such part, as the case may be, shall be extended by a period equal to the period during which the Facilities or such part cannot be used by the Purchaser because of any of the aforesaid reasons. Upon correction of the defects in the Facilities or any part thereof by repair/replacement, such repair/replacement shall have the defect liability period of twelve (12) months from such replacement.

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

xiii. Latent defect liability: Notwithstanding, the defect liability period of 12 months above, the plant shall carry a latent defect liability of 5 years from date of operational acceptance towards any design/ manufacturing defects in the equipment supplied by the Contractor .

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

72. LIMITATION OF LIABILITY

Notwithstanding anything contrary contained herein, the aggregate total liability of Contractor under the Agreement or otherwise shall be limited to **100% of Agreement/ Contract Value**. However, neither party shall be liable to the other party for any indirect and consequential damages, loss of profits or loss of production.

73. GUARANTEE/ WARRANTY

As enumerated in Clause no. 71 (Defect Liability Period) of GCC, the overall Defect Liability Period should stand valid for a period of 12 (Twelve) Months from the date of Operational Acceptance. However, Contractor needs to ensure following Guarantees/ Warrantees to the best possible extent for the successful execution of the Contract. Subsequently, necessary Guarantee/ Warranty Certificate shall be produced by the Contractor prior to Operational Acceptance of the Facility.

Guarantee/ Warranty as defined under Section VII, Scope of work and Technical specifications will prevail in this clause. Contractor should guarantee the Plant facility for the workmanship (Latent defect liability) for a period of 05 (Five) years from the date of Operational Acceptance.

i. The Contractor must ensure that the goods supplied under the Contract are new, unused and of most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

ii. The Contractor shall transfer the warranty/ guarantees of the equipment as such from the OEM/ supplier in the name of the Owner. The period of the warranty / guarantee for each equipment shall be as per the “Technical Specifications”.

iii. During the period of Warranty / Guarantee the Contractor shall remain liable to replace any defective parts, that becomes defective in the plant, of its own manufacture or that of its sub-contractors, under the conditions provided for by the Contract under and arising solely from faulty design, materials or workmanship & faulty operation/repair, provided such defective parts are not repairable at Site. After replacement, the Contractor is allowed to take back the defective parts to its works at his expenses

iv. At the end of warranty/ guarantee period, the Contractor’s liability shall cease subjected to fulfillment of its liability under GCC Clause 73 (Defect Liability Period). In respect of goods not mentioned for the warranty/ guarantee in “Technical Specifications”, the Owner shall be entitled to the benefit of such guarantee given to the Contractor by the original Supplier or manufacturer of such goods e.g. performance guarantee for 25 yrs for modules, etc.

v. During the Comprehensive Annual Maintenance (AMC) period, the Contractor shall be responsible for any defects in the work due to faulty workmanship or due to use of sub-standard materials in the work. Any defects in the work during the guarantee period shall therefore, be rectified by the Contractor without any extra cost to the Owner within a reasonable

time as may be considered from the date of receipt of such intimation from the Owner failing which the Owner reserves the right to take up rectification work at the risk and cost of the Contractor.

74. CARE OF WORKS

From the commencement to completion of the Work & till the completion of AMC period, the Contractor shall take full responsibility for the care for all works including all temporary works and in case any damages, loss or injury shall happen to the Work or to any part thereof or to any temporary works from any cause whatsoever, shall at his own cost repair and make good the same so that at completion the Work shall be in good order and in conformity in every respects with the requirement of the Contract and the site-in- Charge's instructions.

75. GUARANTEE/ TRANSFER OF GUARANTEE

For the major Material/Products/Spares of the works & Projects including but not limited to PV Modules, Power Conditioning Units (PCU)/ Inverters, Transformers, Batteries (If applicable) etc the Contractor shall invariably engage OEMs/Sub-Contractors who are specialists in the field and Original Equipment Manufacturers (OEM's)/Original Part Manufacturers (OPM's) /firms of repute and such a OEM/OPM/Sub- Contractor shall furnish guarantees/warranties for their workmanship to the Purchaser directly in the name of Purchaser only without any deviation. The Contractor shall give the guarantee/warrantee to the Purchaser directly For other minor Material/Products/Spares also.

In case of the contract termination/cancellation and wherein the title of Guarantee/Warrantee for the major Material/Products/Spares of the works & Projects including but not limited to PV Modules, Power Conditioning Units (PCU)/ Inverters, Transformers, Batteries (If applicable) is in the name of the contractor, then all such Guarantee/Warrantees for all such major products/material/spares will have to be mandatorily transferred in the name of Purchaser as soon as the contract is terminated/cancelled & no plea/deviation from the contractor side will be entertained in this regard.

For works like water-proofing, acid and alkali resisting materials, pre-

construction soil treatment against termite or any other specialized works etc. the Contractor shall invariably engage Sub- Contractors who are specialists in the field and firms of repute and such a Sub-Contractor shall furnish guarantees for their workmanship to the Purchaser, through the Contractor. In case such a Sub- Contractor is not prepared to furnish a guarantee to the Purchaser, the Contractor shall give that guarantee to the Purchaser directly.

76. INSTALLATION AND TRAINING OF BBMB's PERSONNEL

76.1 TOOLS & TACKLES

The Contractor shall provide technically suitable tools and tackles for installation & erection of Plant & Machineries conforming to relevant BIS safety and technical standards for proper execution of work. The Purchaser, in no way, shall be responsible for supply of any tools and tackles for implementation of the work and also to carry out AMC activities.

76.2 SETTING UP/SUPERVISION/LABOR

76.2.1 BENCH MARK:

The Contractor shall be responsible for the true and proper setting-up of the Facilities in relation to bench marks, reference marks which are mutually agreed upon by the contractor and Purchaser.

If, at any time during the progress of installation of the Facilities, any error shall appear in the position, level or alignment of the Facilities, the Contractor shall forthwith notify the Site-in-charge of such error and, at its own expense, immediately rectify such error.

76.2.2 CONTRACTOR'S SUPERVISION:

The Contractor shall give or provide all necessary supervision during the installation of the Facilities, and the Construction Manager or its deputy shall be constantly on the Site to provide full-time supervision of the installation. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective fields and supervisory staff who are competent to adequately supervise the work at hand.

76.2.3 LABUOR:

The Contractor shall provide and employ on Site in the installation of the Facilities such skilled, semi- skilled and unskilled labor as is necessary for proper and timely execution of the Contract. The Contractor is encouraged to use local labor that has the necessary skills.

Unless otherwise provided in the Contract, the Contractor shall be responsible for the recruitment, transportation, accommodation, sanitation, first aid facility and catering of all labor, local or expatriate, required for the execution of the Contract and for all payments in connection therewith.

The Contractor shall be responsible for obtaining all necessary permit(s) and/or pass(s) from the appropriate authorities for the entry of all labour and personnel to be employed by contractor on the Site including that of his sub-contractors.
The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst its employees and the labour of its Subcontractors.

The Contractor shall, in all dealings with its labour and the labour of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of labor.
The contractor shall keep the Purchaser indemnify, during construction as well as during AMC period, in respect of compliance with the statutory provisions in respect to the labor employed at site.
Upon completion of the construction activities/ AMC activities, the contractor shall obtain no objection certificate (NOC) from local/ statutory bodies (if any) in respect to the fulfillment of all compliance and submit a copy to the Purchaser prior to the final settlement.

76.3 CONTRACTOR'S EQUIPMENT

76.3.1 All equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the site-in-charge's consent that such Contractor's Equipment is no longer required for the

execution of the Contract.

All the necessary approvals with due taxes, insurance and license, as required for the use of equipment at site, are to be taken by the Contractor.

The equipment should be in a good operating condition for safe use at site. The operator shall be competent to operate. It is advised to keep adequate spares to reduce the breakdown time.

76.3.2 Unless otherwise specified in the Contract, upon completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor onto the Site.

76.4 SITE REGULATIONS AND SAFETY

Contractor shall submit the Environment, Health, Safety(EHS) policy for the site to the Site-in-charge within 14 (fourteen) days from LOA and shall abide by the rules and regulations of the EHS policy.

The Contractor shall have to provide necessary and adequate safety measures including personal protective equipment and precautions to avoid any accident, which may cause damage to any equipment / material or injury to workmen. The Purchaser shall not be liable for any such accidents during the performance of the contract.

The contractor, if required, will provide necessary safety training to workmen. Also, contractor shall engage sufficient security guards to protect Facility from any theft and unauthorized access to Site.

76.5 SITE CLEARANCE

76.5.1 SITE CLEARANCE IN COURSE OF PERFORMANCE

In the course of carrying out the Contract, the Contractor shall keep the Site reasonably free from all unnecessary obstruction, store or remove any surplus materials, clear away any wreckage, packaging material, rubbish & debris and temporary installations from the Site, and remove any Contractor’s Equipment no longer required for execution of the Contract with due approval of the Purchaser.

76.5.2 SITE CLEARANCE AFTER COMPLETION

After Completion of all parts of the Facilities, the Contractor shall clear away and remove all wreckage, packaging material, rubbish & debris and temporary works & installations of any kind from the Site with due approval of the Purchaser and shall leave the Site and Facilities clean and safe.

76.5.3 DISPOSAL OF SCRAP

The term ‘Scrap’ shall refer to scrap/ waste/ remnants arising out of the unpacking of equipment, construction debris, breakage of modules, fabrication of structural steel work and piping work at the project site in the course of execution of the contract and shall also include any wastage of cables during the termination process while installing the cables.

The Contractor shall with the agreement of the Purchaser promptly remove from the site any ‘Scrap’ generated during Performance of any activities at site in pursuance of the Contract.

The disposal of such Scrap shall vest with the Contractor for the items supplied by the Contractor and issued by Purchaser under this contract for installation and construction without any additional cost to the Purchaser. The removal of scrap shall be subject to the due approval of Purchaser & Contractor producing the necessary clearance from the relevant authorities (Custom, Excise etc.), if required by the law, in respect of disposal of the scrap. The liability for the payment of the applicable GST shall be that of the Contractor.

The Contractor shall also indemnify to keep the Purchaser harmless from any act of omission or negligence on the part of the Contractor in following the statutory requirements with regard to removal/disposal of scrap. The undertaking shall be furnished by contractor as per Format enclosed in the Section VI of Forms & Formats. Further, in case the laws require the Purchaser to take prior permission of the relevant Authorities before handing over the scrap to the Contractor, the same shall be obtained by the Contractor on behalf of the Purchaser.

76.5.4 WATCH & WARD AND LIGHTING

The Contractor shall provide and maintain at its own expense all lighting, fencing, watch and ward wherever necessary for the proper execution and the protection of the Facilities, or for the safety of the Purchasers and occupiers of adjacent property and for the safety of the public.

76.6 TRAINING

The contractor shall provide training (free of cost) to the personnel of BBMB for 50 (Fifty) man-days at the shops, where the equipment will be manufactured and/ or in their collaborator's works and where possible, in any other plant where equipment manufactured by the Contractor or his collaborators is under installation or test to enable those personnel to become familiar with the equipment being furnished by the Contractor/ or at his works/or at the mutually agreed designated place/ or at site for erection, testing, commissioning and AMC of the Project. Such training may include Class Room & hands on experience etc. as mutually agreed. These man-days can be in single shot or multi visits as per purchaser discretion.

BBMB shall bear the cost of Boarding, Lodging & Travel only for the said personnels.

The Contractor undertakes to provide training to Personnel selected and sent by the Purchaser at the works of the Contractor without any cost to the Purchaser.

77. REPLACEMENT OF DEFECTIVE PARTS AND MATERIALS

If during the progress of the Work, Purchaser shall decide and inform in writing to the Contractor, that the Contractor has manufactured any plant or part of the plant unsound or imperfect or has furnished plant inferior to the quality specified, the Contractor on receiving details of such defects or deficiencies shall at his own expenses within 07 (Seven) days of his receiving the notice, or otherwise within such time as may be reasonably necessary for making it good, proceed to alter, re-construct or remove such work and furnish fresh equipment's up to the standards of the specifications.

In case the Contractor fails to do so, Purchaser may on giving the Contractor 07 (Seven) day notice in writing of his intentions to do so, proceed to remove the

portion of the Work so complained of and at the cost of Contractor's, perform all such works or furnish all such equipment's provided that nothing in the clause shall be deemed to deprive the Purchaser of or affect any rights under the Contract, the Purchaser may otherwise have in respect of such defects and deficiencies.

78. INDEMNITY

If any action is brought before a Court, Tribunal or any other Authority against the BBMBor an officer or agent of the BBMB, for the failure, omission or neglect on the part of the Contractor to perform any acts, matters, covenants or things under the Contract, or damage or injuryor death caused by the alleged omission or negligence on the part of the Contractor, his agents, representatives or his Sub-Contractor's, or in connection with any claim based on lawful demands of Sub-Contractor's workmen Bidders or employees, the Contractor, shall in such cases indemnify and keep the BBMB and/ or their representatives harmless from all losses, damages, expenses or decrees arising out of such action.

79. CONSTRUCTION AIDS, EQUIPMENT, TOOLS & TACKLES

Contractor shall be solely responsible for making available for executing the Work, all requisite Construction Equipment's, Special Aids, Barges, Cranes and the like, all Tools, Tackles and Testing Equipment and Appliances, including imports & insurance of such equipment etc. as required. In case of import of the same the rates applicable for levying of Custom Duty on such Equipment, Tools & Tackles and the duty drawback applicable thereon shall be ascertained by the Contractor from the concerned authorities of Government of India. It shall be clearly understood that Purchaser shall not in any way be responsible for arranging to obtain Custom Clearance and/ or payment of any duties and/ or duty draw backs, license etc. for such equipment's so imported by the Contractor and the Contractor shall be fully responsible for Goods and Service Tax (GST) and documentation with regard to the same. Bidder in his own interest may contact, for any clarifications in the matter, concerned agencies/ Dept./ Ministries of Govt. of India. All clarifications so obtained and interpretations thereof shall be solely the responsibility of the Contractor.

[F] CERTIFICATES AND PAYMENTS

80. SCHEDULE OF RATES AND PAYMENTS

80.1 CONTRACTOR'S REMUNERATION

For EPC/ Lumpsum Turnkey Contracts, the billing procedure will follow as per the prescribed payment terms as defined in Special Conditions of Contract (SCC).The price to be paid by the Purchaser to Contractor for the whole of the Work to be done and for the performance of all the obligations undertaken by the Contractor under the Contract Documents shall be ascertained by the application of the respective Schedule of Rates (the inclusive nature of which is more particularly defined by way of application but not of limitation, with the succeeding Clause of this clause) and payment to be made accordingly for the Work actually executed and approved by the site-in- Charge/Purchaser. The sum so ascertained shall (excepting only as and to the extent expressly provided herein) constitute the sole and inclusive remuneration of the Contractor under the Contract and no further or other payment whatsoever shall be or become due or payable to the Contractor under the Contract.

80.2 SCHEDULE OF RATES TO BE INCLUSIVE

The prices quoted by the Contractor shall remain firm till the contract period and shall not be subject to escalation. Schedule of Rates shall be deemed to include and cover all costs, expenses and liabilities of every description and all risks of every kind to be taken in executing, completing and handing over the Work to the Purchaser by the Contractor. The Contractor shall be deemed to have known the nature, scope, magnitude and the extent of the Work and materials required though the Contract Document may not fully and precisely furnish them. Bidders in the Schedule of Rates should cover all costs as he may consider necessary to cover the cost of any works and materials as may be reasonable and necessary to complete the Work. Generality of this present provision shall not be deemed to cut down or limit in any way because in certain cases it may and in other cases it may not be expressly stated that the Contractor shall do or perform a work or supply articles or perform services at his own cost or without addition of payment or without extra charge or words to the same effect or that it may be stated or not stated that the same are included in and covered by the Schedule of Rates.

80.3 SCHEDULE OF RATES TO COVER CONSTRUCTION EQUIPMENT'S, MATERIALS, LABOUR ETC.

Without in any way limiting the provisions of the preceding Clause the Schedule of Rates shall be deemed to include and cover the cost of all construction equipment, temporary Work (except as provided for herein), pumps, materials, labour, insurance, fuel, consumables, stores and appliances to be supplied by the Contractor and all other matters in connection with each item in the Schedule of Rates and the execution of the Work or any portion thereof finished, complete in every respect and maintained as shown or described in the Contract Documents or as may be ordered in writing during the continuance of the Contract.

80.4 SCHEDULE OF RATES TO COVER ROYALTIES, RENTS AND CLAIMS

The Schedule of Rates (i.e., Contract Value) shall be deemed to include and cover the cost of all Royalties and Fees for the articles and processes, protected by letters, patent or otherwise incorporated in or used in connection with the Work, also all Royalties, Rents and other payments in connection with obtaining materials of whatsoever kind for the Work and shall include an Indemnity to the Purchaser which the Contractor hereby gives against all actions, proceedings, claims, damages, costs and expenses arising from the incorporation in or use on the Work of any such articles, processes or materials, other municipal or local Board Charges, if levied on materials, equipment or machineries to be brought to site for use on Work shall be borne by the Contractor.

80.5 SCHEDULE OF RATES TO COVER GST/APPLICABLE TAXES

No exemption or reduction of Customs Duties, Goods & Service Tax (GST) on Works Contract quay or any port dues, transport charges, stamp duties or Central or State Government or Local Body or Municipal Taxes or from or of any other body, whatsoever, will be granted or obtained, all of which expenses shall be deemed to be included in and covered by the Schedule of Rates. The Contractor shall also obtain and pay for all permits or other privileges necessary to complete the Work.

80.6 SCHEDULE OF RATES TO COVER RISKS OF DELAY

The Schedule of Rates shall be deemed to include and cover the risk of all possibilities of delay and interference with the Contractor's conduct of Work which occur from any causes including orders ofthe Purchaser in the exercise of his power and on account of extension of time granted due to various reasons and for all other possible or probable causes of delay.

80.7 SCHEDULE OF RATES CANNOT BE ALTERED

(a) For Engineering, Procurement and Commissioning (EPC) Contracts/ Lumpsum Turnkey (LSTK) Contracts, the total Project/ Contract Value stands to be fixed inclusive of entire items, Materials, Spares, Consumables, Services, Erection and all quoted and unquoted items/ Services in the Bill of Quantity (BOQ) of the Tender/ Contract. Contract Value of such EPC Contracts comprises of all the related costs required for successful execution of the work. The final payment outlay or total cost of the project will be limited to the total value of the EPC Contract (supply, Service, Mandatory spares) and AMC Contract. Any kind of variations related to Total Contract Value shall be to Contractor’s account. The payment will be made according to the Work carried out, for which purpose an item wise, or work wise Schedule of Rates shall be furnished, suitable for evaluatingthe value of Work done and preparing running account bill.

(b) If applicable, For Item Rate Contracts, no alteration will be allowed in the Schedule of Rates by reason of works or any part of them being modified, altered, extended, diminished or committed. The Schedule of Rates are fully inclusive of rates which have been fixed by the Contractor and agreed to by the Purchaser and cannot be altered.

Based on the mechanism of Tender as described in the Special Conditions of Contract (SCC), the methodologies described above shall prevail.

81. PROCEDURE FOR MEASUREMENT AND BILLING

81.1 MEASUREMENTS

All measurements shall be in metric system. All the works in progress will be jointly measured by the representative of the Engineer-in-Charge and the

Contractor's authorized agent progressively. Such measurement will be got recorded in the measurement book by the Site-in-Charge or his authorized representative and signed in token of acceptance by the contractor or his authorized representative.

For the purpose of taking joint measurement the contractor's representative shall be bound to be present whenever required by the Engineer-in-Charge. If, however, he absents for any reason whatsoever the measurement will be taken by the Engineer-in-Charge or his representative and this will be deemed to be correct and binding on the contractor.

81.2 BILLING PROCEDURE

Following procedures shall be adopted for billing of works executed by the Contractor.

81.2.1 For EPC/ Lumpsum Turnkey Contracts, the billing procedure will follow as per the prescribed payment terms as defined in Special Conditions of Contract (SCC).

81.2.2 If applicable, Form Item Rate Contracts, all measurements shall be recorded in sextuplicate on standard measurement sheets in duly approved formats for scrutiny and passing by Purchaser. Purchaser shall scrutinize and check the measurements recorded on the sheets and shall certify correctness of the same on the measurement sheets.

81.2.3 Site-In-Charge shall pass the bills after carrying out the comprehensive checks in accordance with the terms and conditions of the Contracts, along with all necessary enclosures and documents, complete in all respects and shall release payment to the Contractor as per the defined payment terms.

81.2.4 BBMB shall make all endeavor to make payments of undisputed amount of the bills submitted based on the joint measurements within 30 (Thirty) days from the date of certification by the Engineer-in-Charge. Any disputed claims/amounts will be mutually settled and paid accordingly

81.2.5 Measurements shall be recorded as per the methods of measurement spelt out in Contract Document.

81.3 SECURED ADVANCE ON MATERIAL

Unless otherwise provided in the SCC of the tender, no 'Secured Advance' on security of materials brought to site for execution of contracted items(s) shall be paid to the Contractor whatsoever.

81.4 DISPUTE IN MODE OF MEASUREMENT

In case of any dispute as to the mode of measurement not covered by the Contract to be adopted for any item of Work, mode of measurement as per latest Indian Standard Specifications shall be followed.

81.5 ROUNDING-OFF OF AMOUNTS

In calculating the amount of each item due to the Contractor in every certificate prepared for payment, sum of less than 50 paise shall be omitted and the total amount on each certificate shall be rounded off to the nearest rupees, i.e., sum of less than 50 paise shall be omitted and sums of 50 paise and more up to one rupee shall be reckoned as one rupee.

82. LUMPSUM IN TENDER

The payment against any Lumpsum item shall be made only on completion of that item (Excluding Milestones linked payment structure) as per the provision of the Contract after certification by Site-In-Charge.

83. RUNNING ACCOUNT PAYMENTS TO BE REGARDED AS ADVANCE

All running account payments shall be regarded as payment by way of advance against the final payment only and not as payments for Work actually done and completed and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected or be considered as an admission of the due performance of the Contract, or any part thereof, in this respect, or of the occurring of any claim by the Contractor, nor shall it conclude, determine or affect in any way the powers of the Purchaser under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise, or in any other way vary or affect the Contract.

The final bill shall be submitted by the Contractor within 01 (One) Month of the date of the final acceptance of the Work; otherwise, the site-in-charge measurement and of total amount payable for the Work accordingly shall be final and binding on all parties

84. NOTICE OF CLAIMS FOR ADDITIONAL PAYMENTS/ EXTRA WORK

Contractor shall not be paid any additional payment entitled to any extra payment for any extra/ additional Works or Material change in original Specifications carried out by him in respect of Work unless take approval from BBMB and Amendment in this regard is issued in Letter of Award.

85. PAYMENT OF CONTRACTOR'S BILL

85.1 Payment due to the Contractor shall be made by the Purchaser either by e-Banking or by Account Payee Cheque forwarding the same to registered office or the notified office of the Contractor. In no case, will Purchaser be responsible if the cheque is mislaid or misappropriated by unauthorized person/ persons. In all cases, the Contractor shall present his bill duly pre-receipted on proper revenue stamp & payment shall be made in Indian Currency only.

85.2 In general payment of final bill shall be made to Contractor as per payment term after the submission of bill on joint measurements, after completion of all the obligations under the Contract against the final completion.

86. RECEIPT FOR PAYMENT

Receipt for payment made on account of work when executed by a company, must be signed by a person holding due power of attorney in this respect on behalf of the Contractor, except when the Contractors are described in their tender as a limited company in which case the receipts must be signed in the name of the company by one of its principal officers or by some other person having authority to give effectual receipt for the company.

87. AMC AFTER OPERARTIONAL ACCEPTANCE BY BIDDER

Subsequent to Operational Acceptance of the Facilities by the Purchaser and within 10 days of the commencement of the AMC period, the Contractor shall furnish an Indemnity Bond/ undertaking as per “Sample Forms and Formats” which is to be executed by the contractor for the plant handed over by Purchaser for performance of its AMC Contract (Entire Solar Photo Voltaic Plant).

The Facility shall be taken over by the Purchaser upon successful Operational Acceptance in accordance with GCC Clause 43.3 (Operational Acceptance).

Immediately after taking over of complete facilities (s), the Facilities will be handed over to the Contractor for Comprehensive AMC for a period as mentioned in the Contract document.

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88. FINAL DECISION AND FINAL ACCEPTANCE

Upon Expiry of the period as defined in Section-V, SCC and subject to the Site-in-Charge being satisfied that the executed works have been duly maintained by the contractor during monsoon or such period as herein before provided in Clause 71, 72, 73 & 74 and that the contractor has in all respect duly made up any subsidence and performed all his obligations under the contract, the Site-in-Charge shall (without prejudice to the rights of the Purchaser to retain the provisions of relevant clause hereof) give a certificate herein referred to as the final certificate to that effect. The contractor shall not be considered to have fulfilled the whole of his obligations under the contract until Final Certificate have been given by the site-in-Charge not withstanding any previous entry upon the work and taking possession, working or using of the same or any part thereof by the Purchaser.

89. DEDUCTIONS FROM THE CONTRACT PRICE

All costs, damages or expenses which Purchaser may have paid or incurred, which under the provisions of the Contract, the Contractor is liable/ will be liable, will be claimed by the Purchaser. All such claims shall be billed by the Purchaser to the Contractor regularly as and when they fall due. Such claims shall be paid by the Contractor within 15 (Fifteen) days of the receipt of the corresponding bills and if not paid by the Contractor within the said period, the Purchaser may, then, deduct the amount from any moneys due i.e., Contract Performance Security or becoming due to the Contractor under the Contract or may be recovered by actions of law or otherwise, if the Contractor fails to satisfy the Purchaser of such claims.

[G] TAXES AND INSURANCE

90. TAXES & DUTIES – GOODS & SERVICE TAX

90.1 Taxes and duties shall be governed by Clause 13.0 of Section ITB of the tender

document.

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

90.3 The Purchaser shall bear and pay/reimburse to the Contractor Goods and Services Tax (GST) applicable on: (a) Plant and Equipment (including Type Test Charges) and Mandatory Spares to be supplied from within the Purchaser's country to be incorporated in the Facilities, by the law of country where the site is located, (b) local transportation & insurance, other local costs incidental to delivery of plant & equipment including mandatory and (c) Installation Services including Erection, Civil & Allied Works and other services. However, all other taxes, duties & levies as may be applicable on goods and services specified in under the contract and on the materials used for civil construction works and erection & commissioning shall be to the contractor's account and no separate claim in this regard will be entertained by the BBMB. Notwithstanding anything to contrary contained in the Contract, the Contractor's right to payment under the Contract is subject to issuance of valid tax invoice, payment of applicable GST to the credit of appropriate Government and submission of valid particulars of tax invoice under GST returns in accordance with GST Law. The Contractor shall issue tax invoices, file appropriate returns, and deposit the applicable GST to the account of appropriate government within the time limit prescribed under the GST Law. In the event of any default, Contractor shall be liable to pay any penalty/demand raised on BBMB due to default by Contractor, and the same shall be recovered/Contractor shall make good the loss. The Contractor shall be responsible for the issuance of e-way bill and other compliances relating to e-way bill as per GST law. The Owner will deduct GST at source at the applicable rates in case transactions under the contract are liable to GST deduction at source as per the prevailing provisions of GST Law.

90.4 The statutory deduction of taxes at source, related to this work, shall be done by

BBMB. TDS so deducted shall be deposited with the relevant tax Authorities & TDS certificates shall be issued by BBMB.

90.5 If any tax exemptions, reductions, allowances or privileges are available to the Contractor , where the Site is located, the BBMB shall use its best endeavors to enable the Contractor to benefit from any such tax savings to the maximum allowable extent.

90.6 The Contractor agrees to and does hereby accept full and exclusive liability for the payment of any and GST/all Taxes. now in force or hereafter imposed, increased, modified, from time to time in respect of Works and materials and all contributions and taxes for unemployment compensation, insurance and old age pensions, PF, ESI etc or annuities now in force or hereafter imposed by any Central or State Government authorities which are imposed with respect to or covered by the wages, salaries or other compensations paid to the persons employed by the Contractor and the Contractor shall be responsible for the compliance of all Sub-Contractors, with all applicable Central, State, Municipal and local law and regulation and requirement of any Central, State or local Government agency or authority.

Contractor further agrees to defend, indemnify and hold BBMB harmless from any liability or penalty which may be imposed by the Central, State or Local authorities by reason or any violation by Contractor or Sub-Contractor of such laws, suits or proceedings that may be brought against the BBMB arising under, growing out of, or by reason of the work provided for by this Contract, by third parties, or by Central or State Government authority or any administrative subdivision thereof. Tax deductions will be made as per the rules and regulations in force in accordance with acts prevailing from time to time.

90.7 Bidder should quote all-inclusive prices including the liability of GST (in line with the given SOR Format) whether on the works contract as a whole or in respect of bought out components used by the Contractor in execution of the Contract. BBMB shall not be responsible for any such liability of the Contractor in respect of this Contract.

90.8 Exemption of GST or any other taxes and duties (if applicable) on Items Manufactured for Grid Connected Solar Photo Voltaic Power Generation Projects

As per extant guidelines of Department of Revenue, Ministry of Finance, Govt. of India, the benefits of exemption of GST or any other taxes and duties (if applicable on items manufactured for grid connected Solar Photo Voltaic Power Generation Projects) may be available for the items to be supplied under the contract, Bidder may appraise itself of the relevant policies and quote accordingly. The Purchaser shall issue the requisite certificate (if required) as specified in the relevant policy of Govt. of India. However, if the certificate is required to be issued by any department/ ministry of Government of India or State Government where the Project is located other than Purchaser, the Bidder shall itself be responsible for obtaining such certificate from the concerned department/ministry. In such a case, the Purchaser may issue recommendatory letter to the bidder. The Bidder shall be solely responsible for obtaining the benefits of exemption on excise duty GST or any other taxes and duties (if applicable) on the items to be supplied under the contract from the Govt. of India. In case of failure of the bidder to receive the benefits partly or fully from Govt. of India or in case of delay in receipt of such benefits, the BBMB shall neither be responsible nor liable in this regard in any manner whatsoever.

91. INCOME TAX

As per Indian Income Tax Act & Rules, BBMB is required to deduct Income Tax at source from all the payments to be made to Nonresident/ Foreign Contractor. For this purpose, the Contractor shall be required to either furnish (i) the certificate from Indian Tax Authority or (ii) Ruling from “the Authority for Advance Ruling (AAR)” determining the applicable rate of Income tax in India before release of first payment. The Contractor will be required to submit PAN details to the BBMB before the submission of the first bill. If the BBMB orders any spare at a later date a, all applicable additional taxes & duties, if any, not included in the original price shall be to the account of BBMB. Notwithstanding anything to contrary contained in the contract agreement, Contractor/Supplier’s right to payment under the contract agreement is subject to issuance of valid tax invoice, payment of applicable GST to the credit of appropriate Government and submission of a valid particulars of tax invoice under GST returns in accordance

with GST Act. Unless expressly stated otherwise, a common mechanism for reconciliation of input credit mismatch, to be followed by both BBMB and Contractor/Supplier, shall be mutually agreed so that both parties follow the same procedure for disclosing the transactions in their respective returns. Notwithstanding anything in the agreement/ contract, penalty / damages shall be recovered in case the Contractor/Supplier makes a default in following the agreed procedure. Contractor/Supplier shall issue tax invoices, file appropriate returns, and deposit the applicable GST to the account of appropriate government within the time limit prescribed under the GST Law. In the event of any default, Contractor/Supplier shall be liable to pay the amount which may be imposed on BBMB due to such default. Contractor/Supplier should comply with the provisions of e-way bill notified by appropriate authorities from time to time. The existing provisions regarding road permit will continue till such time if applicable. BBMB will deduct GST at source at the applicable rates in case transactions under the contract are liable to GST deduction at source as per the prevailing provisions of GST Law.

92. STATUTORY VARIATIONS

92.1 Goods & Service Tax (GST) [applicable for both Centre and state] and other levies [if any] payable by the Contractor under the Contract, or for any other cause, shall be included in the rates/ prices and the total bid-price submitted by the Bidder. Applicable rate of GST shall be indicated in Agreed Schedule of Rate (SOR's) formats.

92.2 For the purpose of the Contract, it is agreed that the Price as specified in the Schedule of Rates (SOR) is based on the taxes, duties, levies and charges prevailing on seven (7) days prior to the deadline set for bid submission in the country where the Site is located. If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of Contract, which was or will be assessed on the Contractor in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction therefrom, as the case may be, in accordance with the Change in Laws and Regulations clause hereof. However,

these adjustments would be restricted to direct transactions between the Employer and Contractor and Bought out items (dispatched directly from sub vendor's works to Site). These adjustments shall not be applicable on procurement of raw materials, intermediary components and intermediary services etc. by the Contractor.

All these adjustments would be carried out by considering the base price of GST/taxes equivalent to the amount mentioned under GST/taxes column of the SOR.

92.3 However, any increase in the rate of these taxes, duties and levies shall be as per Clause 50 of Section- IV, GCC , Change in Laws and Regulations .

93. INSURANCE

To the extent specified in the Contract Agreement, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions. The identity of the insurers and the form of the policies shall be subject to the approval of the Purchaser, who should not unreasonably withhold such approval.

93.1 During the Contract period including AMC period, i.e., during Construction & AMC period, all insurance related expenses shall be borne by the Contractor. The goods supplied under the Contract shall be fully insured against the loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in such a manner that Purchaser shall not incur any financial loss.

93.2 In case of any loss or damage or pilferage or theft or fire accident or combination of the said incidents etc. under the coverage of insurance, the Contractor shall lodge the claim as per rules of insurance. Any FIR required to be lodged to local Police Station shall be the responsibility of the Contractor.

93.3 The Contractor shall arrange to supply/ rectify/ recover the materials even if the claim is unsettled for timely completion of the project. The final financial settlement with the insurance company shall rest upon the Contractor.

93.4 In case of any delay of the project attributable to the Contractor, the Contractor himself in consultation with Purchaser should take the extension of insurance. Any financial implications shall, however, be borne by the Contractor.

93.5 The Contractor should arrange for providing insurance coverage to its workmen under Workmen's Compensation Act or similar Rules and Acts as applicable during execution of work for covering risk against any mishap to its workmen. The Contractor shall also undertake a Third-Party Insurance and shall at all times keep BBMB indemnified against any Third-Party claims and shall arrange to settle them at the earliest. BBMB will not be liable for any such loss or mishap.

93.6 All other insurance like In – transit insurance (Marine/ Cargo/ others as applicable), Construction All Risk, Erection All Risk, workmen compensation, fire, third party liability, insurance against theft and acts of GOD, contractor's Equipment's & his vehicles and others as required for the Construction and AMC of the Plant and to indemnify the Purchaser/ equipment/ material and resources shall be borne by the Contractor

93.7 Purchaser shall be named as co – insured under all insurance policies taken out by the contractor, except for the workmen compensation, third party liability and Purchaser's liability insurances. All insurers' rights of subrogation against such co – insured for losses or claims arising out of the performance of the contract shall be waived under such policies.

93.8 All the insurance cover taken for the construction and AMC period shall be seamless in nature & preferably taken by the same insurance company.

93.9 The insurance is to be suitably taken for the activity/ act which is required to cover all the risks associated to the activity / act. The contractor shall be responsible to take suitable insurance till the completion of the AMC contract and indemnify the Purchaser from all associated risks whatsoever.

93.10 The contractor shall be responsible to take suitable insurance(s) and claim management during and till the completion of the AMC contract and indemnify the Purchaser from all associated risks whatsoever.

Various Types of Insurance to be taken by Contractor during Construction & AMC period

93.11 EMPLOYEES STATE INSURANCE (ESI) ACT

The Contractor agrees to and does hereby accept full and exclusive liability for the compliance with all obligations imposed by the Employee State Insurance Act 1948 and the Contractor further agrees to defend, indemnify and hold BBMB harmless for any liability or penalty which may be imposed by the Central, State or Local authority by reason of any asserted violation by Contractor or Sub-Contractor of the Employees' State Insurance Act, 1948, and also from all claims, suits or proceeding that may be brought against the BBMB arising under, growing out of or by reasons of the work provided for by this Contractor, by third parties or by Central or State Government authority or any political sub- division thereof.

The Contractor agrees to fill in with the Employee's State Insurance Corporation, the Declaration Forms, and all forms which may be required in respect of the Contractor's or Sub-Contractor's employees, who are employed in the Work provided for or those covered by ESI from time to time under the Agreement. The Contractor shall deduct and secure the agreement of the Sub-Contractor to deduct the Employee's contribution as per the first schedule of the Employee's State Insurance Act from wages and affix the Employees Contribution Card at wages payment intervals.

The Contractor shall remit and secure the agreement of Sub-Contractor to remit to the Employee's State Insurance Corporation Account, the Employee's contribution as required by the Act. The Contractor agrees to maintain all cards and Records as required under the Act in respect of employees and payments and the Contractor shall secure the agreement of the Sub-Contractor to maintain such records. Any expenses incurred for the contributions, making contributions or maintaining records shall be to the Contractor's or Sub-Contractor's account.

93.12 WORKMEN COMPENSATION AND PURCHASER'S LIABILITY INSURANCE

Insurance shall be affected for all the Contractor's employees engaged in the

performance of this Contract. If any of the work is sublet, the Contractor shall require the Sub-Contractor to provide workman's Compensation and Purchaser's liability insurance for the later employees if such Employees are not covered under the Contractor's Insurance.

93.13 ACCIDENT OR INJURY TO WORKMEN

The BBMB shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workman or other person in the Employment of the Contractor or any Sub-Contractor save and except an accident or injury resulting from any act or default of the BBMB, his representatives and the Contractor shall indemnify and keep indemnified the BBMB against all such damages and compensation (save and except and aforesaid) and against all claims, demands, proceeding, costs, charges and expenses, whatsoever in respect or in relation thereto.

93.14 TRANSIT/ CARGO INSURANCE

In respect of all items to be transported by the Contractor to the Site of Work and any consequential risks, the cost of transit insurance should be borne by the Contractor and the quoted price shall be inclusive of this cost.

Covering loss or damage occurring, while in transit from the supplier's or manufacturer's works or stores until arrival at the Site, to the Facilities (including spare parts therefor) and to the construction equipment to be provided by the Contractor or its Subcontractors.

Amount	**Deductible Limits**	**Parties Insured**	**From**	**To**
110% of the Ex-works value of supply	Nil	Contractor & Owner	Ware House	Ware House+60 days

93.15 COMPREHENSIVE AUTOMOBILE INSURANCE

This insurance shall be in such a form as to protect the Contractor against all claims for injuries, disability, disease and death to members of public including Purchaser's men and damage to the property of others arising from the use of motor vehicles during on or off the site operations, irrespective of the Employer

ship of such vehicles.

Insurances shall be valid for the total contract period. No extra payments will be made by the BBMB for this the vehicle insurance. BBMB shall not be liable for any damage or loss, not made good by the insurance company, should such damage or loss result from unauthorized use of the Vehicle.

93.16 INSTALLATION ALL RISKS INSURANCE

Covering physical loss or damage to the Facilities at the Site, occurring prior to Completion of the Facilities, with extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the Defect Liability Period while the Contractor is on the Site for the purpose of performing its obligations during the Defect Liability Period.

Amount	**Deductible Limits**	**Parties Insured**	**From**	**To**
110% of the Ex-works value of supply	Nil	Contractor, Sub contractor & Owner	Receipt at site	Upto Defect Liability period

93.17 COMPREHENSIVE GENERAL LIABILITY INSURANCE

a) This insurance shall protect the Contractor against all claims arising from injuries, disabilities, disease or death of member of public or damage to property of others due to any act or omission on the part of the Contractor, his agents, his employees, his representatives and Sub-Contractor's or from riots, strikes and civil commotion.

b) Contractor shall take suitable Group Personal Accident Insurance Cover for taking care of injury, damage or any other risks in respect of his Engineers and other Supervisory staff who are not covered under Employees State Insurance Act.

c) The policy shall cover third party liability. The third party (liability shall cover the loss/ disablement of human life (person not belonging to the Contractor)

and also cover the risk of damage to others materials/ equipment/ properties during construction, erection and commissioning at site.

The value of third-party liability for compensation for loss of human life or partial/ full disablement shall be of required statutory value but not less than INR 02 (Two) Lakhs per death, INR 1.5 (One and Half) Lakhs per full disablement and INR 1 (One) Lakh per partial disablement and shall nevertheless cover such compensation as may be awarded by Court by Law in India and cover for damage to others equipment/ property as approved by the Purchaser. However, third party risk shall be maximum to INR 10 (Ten) Lakhs to death.

d) The Contractor shall also arrange suitable insurance to cover damage, loss, accidents, risks etc., in respect of all his plant, equipment and machinery, erection tools & tackles and all other temporary attachments brought by him at site to execute the work.

e) The Contractor shall take out insurance policy in the joint name of Purchaser and Contractor from one or more nationalized insurance company from any branch office at Project site.

f) Any such insurance requirements as are hereby established as the minimum policies and coverages which Contractor must secure and keep in force must be complied with, Contractor shall at all times be free to obtain additional or increased coverages at Contractor's sole expenses.

93.18 The Contractor shall also arrange suitable insurance to cover following during the AMC Period:

a) Machinery Breakdown: Electrical & or machinery breakdown of any machinery or other equipment resulting in costly repairs or even replacement of the solar panel.

b) Business Interruption: Cover for period of operational downtime i.e., covering the cash flow of the solar business as a result of an insured peril, for example fire or storm damage, machinery breakdown or equipment failure.

c) Property Damage: The insurance should cover material damage due to

external causes such as fire, theft, vandalism, sabotage, hail damage, snow load, lightning strike, overload, operational mistakes, clumsiness, negligence & theft.

d) Employers Liability: Provides cover against the risk of accident from usual workplace risks such as working at height & manual handling during construction & AMC period.

e) Environmental Risk Insurance: Environmental damage coverage indemnifies solar system owners of the risk of either environmental damage done by their development or pre-existing damage on the development site.

93.19 ANY OTHER INSURANCE REQUIRED UNDER LAW OR REGULATIONS OR BY PURCHASER:

Contractor shall also carry and maintain any and all other insurance(s) which he may be required under any law or regulation from time to time without any extra cost to Purchaser. He shall also carry and maintain any other insurance which may be required by the Purchaser related to project.

Amount	**Deductible Limits**	**Parties Insured**	**From**	**To**
To be indicated by the Contractor	Nil	Contractor, Sub contractor & Owner	Receipt at site	Upto Defect Liability period

94. DAMAGE TO PROPERTY OR TO ANY PERSON OR ANY THIRD PARTY

94.1 Contractor shall be responsible for making good to any loss or any damage to structures and properties belonging to the Purchaser or being executed or procured or being procured by the Purchaser or of other agencies within in the premises of all the work of the Purchaser, if such loss or damage is due to fault and/ or the negligence or willful acts or omission of the Contractor, his employees, agents, representatives or Sub-Contractors.

94.2 The Contractor shall take sufficient care in moving his plants, equipment and materials from one place to another so that they do not cause any damage to any person or to the property of the BBMB or any third party including overhead

and underground cables and in the event of any damage resulting to the property of the Purchaser or of a third party during the movement of the aforesaid plant, equipment or materials the cost of such damages including eventual loss of production, operation or services in any plant or establishment as estimated by the BBMB or ascertained or demanded by the third party shall be borne by the Contractor. Third party liability risk shall be INR 1 (One) Lakh for single accident and limited to INR 10 (Ten) Lakhs.

94.3 The Contractor shall indemnify and keep the BBMB harmless of all claims for damages to property other than Purchaser's property arising under or by reason of this agreement, if such claims result from the fault and/ or negligence or willful acts or omission of the Contractor, his employees, agents, representative of Sub-Contractor.

[H] LABOUR LAWS

95. LABOUR LAWS & INDEMNITY BOND

95.1 No labour below the age of 18 (Eighteen) Years shall be employed on the Work.

95.2 The Contractor shall at his expense comply with all labour laws and keep the BBMB indemnified in respect thereof.

95.3 The Contractor shall employ labour in sufficient numbers either directly or through Sub- Contractor's to maintain the required rate of progress and of quality to ensure workmanship of the degree specified in the Contract.

95.4 The Contractor shall indemnify the BBMB against any payments to be made under and for the observance of the provisions of the aforesaid labour compliances without prejudice to his right to obtain indemnity from his Sub-Contractor's.

95.5 The Contractor shall also indemnify to keep the Purchaser harmless from any act of omission or negligence on the part of the Labour Laws compliance in following the statutory requirements with regard to Labour laws. Against the signing of the contract, The Indemnity Bond shall be furnished by contractor as

per Format enclosed under Forms and Formats for the labour law compliance.

95.6 Upon completion of the construction activities/ AMC activities, the contractor shall obtain no – objection certificate (NOC) from local/ statutory bodies in respect to the fulfillment of all compliance related to labour law and submit a copy to the Purchaser prior to the final settlement

96. CONTRACTOR TO INDEMNIFY THE BBMB

96.1 The Contractor shall indemnify the BBMB and every member, office and employee of the BBMB, also the Site-In-Charge and his staff against all actions, proceedings, claims, demands, costs and expenses whatsoever arising out of or in connection with the matters referred to in Clause 93 and elsewhere and all actions, proceedings, claims, demands, costs and expenses which may be made against the BBMB for or in respect of or arising out of any failure by the Contractor in the performance of his obligations under the Contract Document.

The BBMB shall not be liable for or in respect of or arising out of any failure by the Contractor in the performance of his obligations under the Contract Document. The BBMB shall not be liable for or in respect of any demand or compensation payable by law in respect or in consequence of any accident or injury to any workmen or other person. In the employment of the Contractor or his Sub-Contractor the Contractor shall indemnify and keep indemnified the BBMB against all such damages and compensations and against all claims, damages, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

96.2 PAYMENT OF CLAIMS AND DAMAGES

Should the BBMB have to pay any money in respect of such claims or demands as aforesaid the amount so paid and the costs incurred by the BBMB shall be charged to and paid by the Contractor and the Contractor shall not be at liberty to dispute or question the right of the BBMB to make such payments notwithstanding the same, may have been made without the consent or authority or in law or otherwise to the contrary.

96.3 In every case in which by virtue of the provisions of Section 12, Sub-section (i) of workmen's compensation Act, 1923 or other applicable provision of Workmen

Compensation Act or any other Act, the BBMB is obliged to pay compensation to a workman employed by the Contractor in execution of the Work, the BBMB will recover from the Contractor the amount of the compensation so paid, and without prejudice to the rights of BBMB under Section 12, Sub- section (2) of the said Act, BBMB shall be at liberty to recover such amount or any part thereof by deducting it from the Contract Performance Security or from any sum due to the Contractor whether under this Contract or otherwise. The BBMB shall not be bound to contest any claim made under Section 12, Sub-section (i) of the said act, except on the written request of the Contractor and upon his giving to the BBMB full security for all costs for which the BBMB might become liable in consequence of contesting such claim.

97. HEALTH AND SANITARY ARRANGEMENTS FOR WORKERS

97.1 In respect of all labour directly or indirectly employed in the Works for the performance of the Contractor's part of this agreement, the Contractor shall comply with or cause to be complied with all the rules and regulations of the local sanitary and other authorities or as framed by the Purchaser from time to time for the protection of health and sanitary arrangements for all workers.

97.2 The Contractor shall provide in the labour colony all amenities such as electricity, water and other sanitary and health arrangements. The Contractor shall also provide necessary surface transportation to the place of work and back to the colony for their personnel accommodated in the labour colony.

[I] APPLICABLE LAWS & SETTLEMENT OF DISPUTES

98. ARBITRATION

As per clause 41 of Section II , ITB.

99. JURISDICTION

The Contract shall be governed by and constructed according to the laws in force in INDIA. The Contractor hereby submits to the jurisdiction of the Court situated at “CHANDIGARH” for the purposes of disputes, actions and proceedings arising out of the Contract, the court at “CHANDIGARH” only will have the jurisdiction to hear and decide such disputed, actions and proceedings.

[J] SAFETY CODES

100. GENERAL

Contractor shall adhere to safe construction practice and guard against hazardous, and unsafe working conditions and shall comply with Safety rules as set forth herein.

Any hazardous material used during construction or used as part of the plant has to be taken back by the Bidder for recycling or dumping purpose after its operating / working life, so that it may not affect the environment or any living being. Contractor has to comply with State Pollution Board regulation.

101. SAFETY REGULATIONS

101.1

i. In respect of all labour, directly employed in the Work for the performance of Contractor's part of this agreement, the Contractor shall at his own expense arrange for all the safety provisions as per safety codes of C.P.W.D., Indian Standards Institution. The Electricity Act, The Mines Act and such other acts as applicable.

ii. The Contractor shall observe and abide by all fire and safety regulations of the Purchaser. Before starting construction, work Contractor shall consult with Purchaser's safety Engineers or Site-in-charge and must make good to the satisfaction of the BBMB any loss or damage due to fire to any portion of the work done or to be done under this agreement or to any of the Purchaser's existing property.

102. FIRST AID AND INDUSTRIAL INJURIES

102.1

i. Contractor shall maintain first aid facilities for its employees and those of its Sub-Contractor.

ii. Contractor shall make arrangements for Ambulance Service, on requirement basis and for the treatment of industrial injuries. Names of those providing these services shall be furnished to BBMB prior to start of construction and their telephone numbers shall be prominently posted in Contractor's Site Office.

iii. All critical industrial injuries shall be reported promptly to site-in-charge, and a copy of Contractor's report covering each personal injury requiring

the attention of a physician shall be furnished to the site-in-charge.

103. CONTRACTOR'S BARRICADES

103.1

i. Contractor shall erect and maintain barricades required in connection with his operation to guardor protect: -

a) Excavations

b) Hoisting Areas.

c) Areas adjudged hazardous by Contractor's or Purchaser’s inspectors.

d) Purchaser’s existing property subject to damage by Contractor's Operations.

e) Rail Road unloading spots

ii. Contractor's employees and those of his Sub-Contractor's shall become acquainted with Purchaser’s barricading practice and shall respect the provisions thereof.

iii. Barricades and hazardous areas adjacent to, but not located in normal routes of travel shall be marked by red flasher lanterns at nights.

104. WORKING AT HEIGHT

i) Scaffolding or staging more than 4 meters above the ground or floor, swing suspended from an overhead support or erected with stationary support shall have a guard rail properly attached, bolted, braced and otherwise retarded at least one meter high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be sofastened as to prevent it from swaying from the building or structure.

ii) Working platform, gangway and stairway should be so constructed that they should not sag unduly or unequally and if the height of platform of the gangway or the stairway is more than 4 meters above the ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as in ii) above.

iii) Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing of railing whose minimum heights shall be 1 meter.

iv) While working at the substation and for construction of transmission line Towers and their subsequent maintenance, experienced manpower should be deployed with appropriate protection Equipment's, such as insulating gloves, fall arrestor etc.

105. EXCAVATION AND TRENCHING

All trenches 1.5 Meters or more in depth, shall at all times be supplied with at least one ladder for each 50 Meters length or fraction thereof. Ladder shall be extended from bottom of the trenches to at least 1 meter above the surface of the ground. The sides of the trenches which are 1.5 Meters in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides to collapse. The excavated materials shall not be placed within 1.5 Meters of the edge of the trench or half of the trench width whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or under-cutting shall be done.

106. DEMOLITION/ GENERAL SAFETY

106.1

i. Before any demolition work is commenced and also during the progress of the demolition work

a) All roads and open areas adjacent to the work site shall either be closed or suitably protected.

b) No electric cable or apparatus which is liable to be a source of danger shall remain electrically charged.

c) All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

ii. All necessary personal safety equipment as considered adequate should be kept available for the use of the persons employed on the Site and maintained in condition suitable for immediate use, and the Contractor shall take adequate steps to ensure proper use of equipment by those concerned.

iii. Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided withprotective footwear and protective gloves.

iv. Those engaged in white washing and mixing or stacking or cement bags or any material which are injurious to the eyes be provided with protective goggles.

v. Those engaged in welding and cutting works shall be provided with protective face & eye shield, hand gloves, etc.

vi. Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

vii. When workers are employed in sewers and manholes, which are in use, the CONTRACTOR shall ensure that the manhole covers are opened and are ventilated at least for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or board to prevent accident to the public.

viii. The CONTRACTOR shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Wherever men above the age of 18 years are employed on the work of lead painting, the following precautions should be taken.

ix. No paint containing lead or lead product shall be used except in the form of paste or readymade paint.

x. Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.

xi. Overalls shall be supplied by the Contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash them during and on cessation of work.

xii. When the work is done near any place where there is risk of drowning, all necessary safety equipment should be provided and kept ready for use

and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

xiii. Use of hoisting machines and tackles including their attachments, anchorage and supports shall conform to the following standards or conditions:

a) These shall be of good mechanical construction, sound materials and adequate strength and free from latent defect and shall be kept in good working order.

b) Every rope used in hoisting or lowering materials or as means of suspension shall be of durable quality and adequate strength and free from patent defects.

c) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding, winch or give signals to the operator.

d) In case of every hoisting machine and of every chain ring hook, shackle, swivel, and pulley block used in hoisting or lowering or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gears referred to above shall be plainly marked with the safe working load of the conditions under which it is applicable and the same shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond safe working load except for the purpose of testing.

e) As regards Contractor's machines, the Contractor shall notify the safe working load of the machine to the Site-In-Charge whenever he brings any machinery to Site of Work and get it verified by the Engineer concerned.

xiv. Motors, gears, transmission lines, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards.

Hoisting appliances should be provided with such means as to reduce to minimum the accidental descent of the load, adequate precautions should be taken to reduce the minimum risk of any part or parts of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves, and boots as may be necessary should be provided. The workers shall not wear any rings, watches and carry keys or other materials whichare good conductors of electricity.

xv. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe conditions and no scaffolds, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.

xvi. These safety provisions should be brought to the notice of all concerned by displaying on a notice board at a prominent place at the work-spot. The person responsible for compliance of the safety code shall be named therein by the Contractor.

xvii. To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangements made by the Contractor shall be open to inspection by the Site-In-Charge or safety Engineer of the Purchaser.

xviii. Notwithstanding the above clauses there is nothing in these to exempt the Contractor for the operations of any other Act or rules in force in the Republic of India. The work throughout includingany temporary works shall be carried out in such a manner as not to interfere in any way whatsoever with the traffic on any roads or footpath at the site or in the vicinity thereto or any existing works whether the property of the Administration or of a third party.

In addition to the above, the Contractor shall abide by the safety code provision as per C.P.W.D. Safety code and Indian Standard Safety Code from time to time.

107. CARE IN HANDLING INFLAMMABLE GAS

The Contractor has to ensure all precautionary measures and exercise utmost care in handling theinflammable gas cylinder/ inflammable liquids/ paints etc. as

required under the law and/ or as advised by the fire Authorities of the Purchaser or Administration.

108. TEMPORARY COMBUSTIBLE STRUCTURES

Temporary combustible structures will not be built near or around work site.

109. PRECAUTIONS AGAINST FIRE

The Contractor will have to provide Fire Extinguishers, Fire Buckets and drums at worksite as per specifications & standards. They will have to ensure all precautionary measures and exercise utmost care in handling the inflammable gas cylinders/ inflammable liquid/ paints etc. as advised by Site-In-Charge. Temporary combustible structure will not be built near or around the work-site.

110. EXPLOSIVES

Explosives shall not be stored or used on the Work or on the Site by the Contractor without the permission of the Site-In-Charge in writing and then only in the manner and to the extent to which such permission is given. When explosives are required for the Work they will be stored in a special magazine to be provided at the cost of the Contractor in accordance with the Explosives Rules. The Contractor shall obtain the necessary license for the storage and the use of explosives and all operations in which or for which explosives are employed shall be at sole risk and responsibility of the Contractor and the Contractor shall indemnify the Purchaser against any loss or damage resulting directly or indirectly therefrom.

111. PRESERVATION OF PLACE

The Contractor shall take requisite precautions and use his best endeavors to prevent any riotous or unlawful behavior by or amongst his worker and others employed or the works and for the preservation of peace and protection of the inhabitants and security of property in the neighborhood of the Work. In the event of the Purchaser requiring the maintenance of a Special Police Force at or inthe vicinity of the site during the tenure of works, the expenses thereof shall be borne by the Contractor and if paid by the Purchaser shall be recoverable from the Contractor.

112. OUTBREAK OF INFECTIOUS DISEASES

The Contractor shall remove from his camp such labour and their facilities who refuse protective inoculation and vaccination when called upon to do. Should Cholera, Plague or other infectious diseases break out the Contractor shall burn the huts, beddings, clothes and other belongings or used by the infected parties and promptly erect new huts on healthy sites as failing which the work may be done by the Purchaser and the cost thereof recovered from the Contractor.

113. USE OF INTOXICANTS

The unauthorized sale of spirits or other intoxicants, beverages upon the work in any of the buildings, encampments or tenements owned, occupied by or within the control of the Contractor or any of his employee is forbidden and the Contractor shall exercise his influence and authority to the utmost extent to secure strict compliance with this condition.

In addition to the above, the Contractor shall abide by the safety code provision as per C.P.W.D. safety code, Indian Standard Code & OHSAS 18001 framed from time to time.

114. PAYING AUTHORITY AND CONSIGNEE DETAILS

Name of Site	**Site Incharge**	**Consignee Details**	**Name of Paying Authority**
Bhiwani	Addl. SE/Sr. Xen 400 kV Division BBMB Bhiwani.	Senior Sub-Station Engineer (SSE) 400kV Sub-Station BBMB Bhiwani.	Senior Account officer, BBMB Delhi.
Hisar	Addl. SE/Sr. Xen 220 kV Division BBMB Hisar.	Senior Sub-Station Engineer (SSE) 220kV Sub-Station BBMB Hisar.	Senior Account officer, BBMB Panipat.

SECTION - V

SPECIAL CONDITIONS OF CONTRACT (SCC)

SPECIAL CONDITIONS OF CONTRACT (SCC)

The following Special Conditions of Contract (SCC) shall supplement the General Conditions of Contract (GCC). Wherever there is a conflict, the provisions herein shall prevail over those in the GCC.

1. TIME SCHEDULE/TIMELINE

The Time for Commissioning for the cumulative capacity as per LOA/Contract agreement Solar PV Power Plant at 02 different sites along with other associated equipment as per this tender document in total shall be 15 (Fifteen) Months from the Date of the Letter of Award (LOA).

Further Contractor is also to provide AMC Contract of Solar Photo Voltaic Plant for a period of 5 (Five) years and extendable for another 5 (five) years from the date of Operational Acceptance of the Plant.

Sr. No.	STAGE	TIMELINE
1	Issue of Letter of Award	Zero Date (D) or reference date for start of project activities.
2	Project Synchronization / Date of successful commissioning	Within 15 months from the issuance of Letter of Award.
~~3~~	Operational Acceptance of Plant	Within 04 (Four) months after the successful commissioning, Project Synchronization and upon demonstration of minimum Performance Ratio (PR) 78%.
~~4~~	Final Acceptance of Plant	Final Acceptance means acceptance of complete project by the Purchaser at the end of one year from the date of Operational Acceptance and upon demonstration of minimum annual parameters as specified in the technical specifications and 21% Annual Capacity Utilization Factor (CUF) at Delivery Point and completion of works under the punch list which certifies the Contractor's fulfilment of the Contract in respect of Functional and Plant Performance Guarantees of the Facilities.
The contractor shall submit the detailed schedule for the project clearly indicating the timelines for submission and approval of drawings, procurement, and transportation of materials to site, their installation at site, commissioning, PR test etc.		

2. LIQUIDATED DAMAGE

Two different EPC and AMC, Letter of Award (LOA) /Contract Agreement will be

released for the respective site (Bhiwani and Hisar) by the Purchaser to the single successful bidder only.

Following LD clause shall be applicable site wise for EPC (Total sum of all the Supply, mandatory spares and Service) and AMC contract separately.

2.1 DELAY IN SYNCHRONIZATION & COMMISSIONING:

1. Subject to Force Majeure Clause, in case the Contractor fails to achieve successful Commissioning of plant by the due date indicated in Time Schedule/Timeline Clause 1 of SCC, then BBMB shall levy the Liquidated Damages on the Contractor (wherein partial commissioning shall not be accepted).

2. The Liquidated Damages levied to the Contractor at half percent (0.5%) per week or part thereof, of the total EPC Contract Price (i.e., total sum of all the Supply, Mandatory spares and Service), excluding taxes & duties (but including freight & insurance charges where break-up of FOR Destination price is not available) for the whole of the facilities subject to maximum limit of ten percent (10%) of total EPC Contract Price (i.e., total sum of all the Supply, Mandatory spares and Service)for whole of the facilities shall be levied.

3. The maximum time period allowed (with liquidated damage) including delay period for commissioning of the Project be 20 (Twenty) months from the date of LOA. In case the delay is more than 20 months, BBMB may terminate the contract, and get the project completed by other suitable agency at the risk and cost of bidder.

4. For calculation of Liquid damage date of LOA shall be the reference date.

5. Delay in Synchronization & Commissioning, LD clause shall be applicable only on the EPC contract Price (i.e., total sum of all the Supply, Mandatory spares and Service) not on the AMC price.

2.2 DELAY IN OPERATIONAL ACCEPTANCE:

During the Operational Acceptance after providing 03 chances for the PR demonstration, any shortfall in the Performance Ratio (PR) as determined

through the PR Test Procedure specified in Section VII, Annexure-B Scope of Work and Technical Specifications, & "**PERFORMANCE GUARANTEE TEST PROCEDURE",** will attract imposition of liquidated damage. For every 0.01 shortfall in PR below 0.78, a penalty of 1% of the total Contract Value (i.e., total sum of all the Supply, Mandatory spares and Service) excluding taxes & duties (but including freight & insurance charges where break-up of FOR Destination price is not available) for the whole of the facilities shall be levied.

In case the Plant **PR result is less than 0.73,** then the total plant will be rejected & the total Contract Performance Security submitted by the contractor will be forfeited & no further payments due to the contractor will be made. In case the Contract Performance Security has already been encashed on account of any default/delays, the penalty amount will be recovered from any due payments to the contractor.

NOTE: For Delay in Operational Acceptance , LD clause shall be applicable only on the EPC contract Price (i.e., total sum of all the Supply, Mandatory spares and Service) not on the AMC price.

2.3 DELAY IN FINAL ACCEPTANCE:

Final Acceptance means acceptance of Facilities by the Purchaser at the end of one year from the date of Operational Acceptance and upon demonstration of minimum annual parameters as specified in the technical specifications and completion of works under the punch list which certifies the Contractor's fulfilment of the Contract in respect of Functional and Plant Performance Guarantees of the Facilities.

Liquidated Damages for Shortfall in Annual CUF

After the operational acceptance the bidder has to demonstrate yearly guaranteed CUF. Shortfall in annual guaranteed CUF shall attract LD as below:

i. If the Contractor fails to achieve guaranteed annual CUF, then the Contractor shall pay compensation to the BBMB annually an amount equal to the difference in units (kWh) derived from guaranteed CUF and achieved CUF multiplied by INR 3/KWh (any shortfall from specified CUF shall attract the LD @ INR 3/kWh for each unit shortfall). The CUF shall be calculated as per the formula

mentioned Section VII, Scope of Work and Technical Specifications.

During AMC, the Contractor, at its own risk and cost, may install additional DC capacity to achieve specified CUF.

ii. If the Contractor fails to achieve the annual guaranteed CUF even at the end of AMC i.e either for 5 years or further extended for another 5 years , then the Contractor shall pay compensation to the BBMB an amount equal to the Net Present Value (NPV) of the estimated revenue loss due to shortfall in CUF for period after the AMC period up to useful life of plant i.e. 25 years, calculated at a discount factor of 8.30% as below

CASE-1

(AMC is for Five Years w.e.f. Operational Acceptance)

If the Contractor fails to achieve the annual guaranteed CUF at the end of 5th year i.e. at the end of AMC period, then the Contractor shall pay compensation to BBMB an amount equal to the Net Present Value (NPV) of the estimated revenue loss due to shortfall in CUF for 6th to 25th year calculated at a discount factor of 8.30% as below.

$$COM = \sum_{n=1}^{20} \left[\frac{(Eg - Ea) X\ C}{(\ 1 + 0.0830)^n} \right]$$

Where,

COM is the compensation payable to purchaser in INR.

Eg is the annual guaranteed CUF at the end of 5th year i.e. at the end of AMC period.

Ea is the annual actual CUF at the end of 5th year i.e. at the end of AMC period.

C is the tariff of INR 3.00 per kWh.

OR

CASE-2

[AMC is for Ten Years (Five with further extendable for Five Years) w.e.f. Operational Acceptance)

If the Contractor fails to achieve the annual guaranteed CUF at the end of 10th year i.e. at the end of AMC period, then the Contractor shall pay compensation to BBMB an amount equal to the Net Present Value (NPV) of the estimated revenue loss due to shortfall in CUF for 11th to 25th year calculated at a discount factor of 8.30% as below.

$$COM = \sum_{n=1}^{15} \left[\frac{(Eg - Ea) X\ C}{(\ 1 + 0.0830)^n} \right]$$

Where,
COM is the compensation payable to purchaser in INR.

Eg is the annual guaranteed CUF at the end of 10th year i.e. at the end of AMC period.

Ea is the annual actual CUF at the end of 10th year i.e. at the end of AMC period.

C is the tariff of INR 3.00 per kWh.

2.4 In case the Project fails to generate any power continuously for 1 month any time during the AMC period, apart from the force majeure and grid outages as certified by competent authority from STU/ CTU/BBMB, it shall be considered as "an event of Contractor's default". In the case of default, the entire Contract Performance Security will be forfeited & the Purchaser may terminate the AMC contract.

2.5 Liquidated damages during AMC period against breakdown of other Infrastructure of Plant which doesn't affect the generation of power, directly such as but not limited to civil infrastructure, water supply system/network, other Infrastructure developed by the Contractor as a Scope of Work for the Project (Section-VII: Scope of Works & Technical Specifications) shall be penalized @ Rs.1000/day, for non-compliance with PM Schedule (Initiation/Completion of Scheduled maintenance Activity as agreed under this Contract) beyond 07 Days of such reporting. Cumulative value of such penalty shall be limited to 50% of yearly AMC cost.

For the purpose of this Clause, the PM shall be inclusive of, but not limited to, the following PM activities:

Item	Scope of Maintenance Activity	Periodicity
Environmental/Corrosive Protective Coatings	Environmental/Corrosive Protective Coatings on equipment's and structures	Once in every 2 years under the AMC Contract period, in consultation with the Purchaser/Site-in-charge
Roads and Access paths	Repair and maintenance of all roads – Access, Internal and Periphery roads, walk ways as well as fences, gates, cable-trenches and outdoor equipment platforms.	Once every year prior to Monsoon season, in Consultation with the Purchaser/Site-in-charge
Water Supply Network	Repair and Maintenance of Water Supply Network including piping network, valves, pumps etc.	Once Every Year in Consultation with the Purchaser/Site-in-charge
Periphery Lighting	Repair and maintenance of Peripheral Lighting including replacement of non-functional lighting fixtures, Junction Boxes, Conduits etc.	Once every SixMonths
Rodent Entry Points	Application/re-application of Anti-rodent protection measures like PUF filling, sealant etc. at Checker/Gland Plates, Cable Entry Points (in PCU/SMU, Switchgear Panels,Enclosures)	Once every SixMonths
All bolted/ tightened	Tightening/fastening of	Once every Year before

structures	bolts that are exposed to winds/vibrations like MMS members/foundation bolts	onset of Windy season, in consultation with the Purchaser/Site-in-charge.
Enclosures of Equipment requiring Temperature and Dust Controlled environment for Normal Operation	Application/re-application of insulation/Dust-Filters/Temperature-control equipment at Enclosures/Buildings housing PCU, Switchgear	Once every Year, consultation with the Purchaser/Site-in-charge.
Entire Plant Facility	Oversight management of the hazardous/toxic materials including its handling and disposal as per Government of India Rules and environmental and safety assessments by a qualified Specialist	Once every Year, in consultation with the Purchaser/Site-in-charge.

Note: The contractor shall ensure intimation and submission of requisite Reports to the Purchaser/Site-in-charge atleast 15 days prior to intimation of maintenance action for the activity.

2.6 Any complaint related to unserviceability/improper functioning of any & all component of the plant including but not limited to PV Module, PCU, Transformers, switchgears, SCADA, roads, drainage, water supply lighting system, office infrastructure, CCTV system should be immediately attended & rectified. If such complaint is not rectified within 48 hours from logging of complaint, Purchaser may choose to rectify the same through any other agency at the risk of Contractor and Purchaser shall recover 110% of such cost incurred from subsequent payment to the contractor.

2.7 The Penalty specified on account of delays, as specified in Liquidated Damages and Penalty specified on account of deviations in Functional Guarantees as above shall be assessed independent of each other. Above mentioned Penalties specified

under this clause of SCC are independent of each other.

2.8 RECOVERY OF COMPENSATION

The above compensations shall be deducted from quarterly billing of Contractor or Contract Performance Security (CPS) submitted by the Contractor or from any pending payment to contractor.

2.9 GST / Taxes on penalties shall be in the bidders account.

3. SCHEDULE OF RATES & PAYMENTS

TERMS OF PAYMENTS:-

All payment shall be made against invoices raised in line with the approved billing break up under individual heads of Supply, mandatory spares, Services and Civil works, AMC etc.

Following general payment terms will be followed:

A) SUPPLY PART (SOR-1)

The payment for the Supply Portion (SOR-1) of the Contract shall be made as per the following terms and conditions:

Sr. No.	Milestone/Activity	Payment for Supply
1	Supply, receipt and acceptance of materials at site	Seventy percent (70%) payments shall be paid on Pro rata basis against supply, receipt and acceptance of materials at site on submission of documents. Contractor's detailed invoice & packing list identifying contents of each shipment, evidence of dispatch (GR/ LR copy), Manufacturer's/ Contractor's Guarantee certificate of Quality, submission of the certificate by the Executing Agency's authorized representative that the item(s) have been received and MDCC (Material Dispatch Clearance Certificate) issued by BBMB authorized representative in original.
2	Upon successful	Ten percent (10%) payments shall be paid against

	erection, preliminary testing and commissioning of material.	successful erection, preliminary testing and commissioning of materials on pro rata basis at site.
3	Completion of Commissioning of Full capacity of Plant	Ten percent (10%) payments shall be paid against successful Commissioning of Full capacity of Plant.
4	Upon Completion of Successful Operational Acceptance.	Final Ten percent (10%) payment of Supplies shall be paid against the Operational Acceptance of the plant Facility pursuant to successful Guarantee Tests and demonstration of Performance Ratio (PR) including submission of all as-built drawings and O&M manual.

B) SERVICE PART (SOR-2)

The payment for the Service Portion Contract (SOR-2) shall be made as per the following terms and conditions. No Initial Advance Payment shall be made against the Service Portion Part.

i) For Freight and Insurance Portion, the payment shall be made in line with Supply Portion of Contract (SOR-1), as described in point 3 A (1) of this clause. The complete payment of the freight will be done along with the respective deliveries of the supply portion at site.

ii) The payment for the For Civil and allied works including construction of Trenches, Module Mounting Structure, foundations, etc. of all the Equipment's Supplied shall be made as per the following terms and condition:-.

Sr. No.	**Milestone/Activity**	**Payment for Works/Erection**
1.	Upon successful completion of Installation of full capacity of the plant	Eighty Percent (80%) of the total price of Civil Works shall be paid progressively on certification by the Site-In - Charge for the quantum of work completed/ Milestones achieved after successful clearance of quality check points involved in the quantum of work.
2.	Upon successful	Ten Percent (10%) of the total price of Civil

	commissioning of full capacity of the plant	Works shall be paid against successful commissioning of the plant on pro rata basis for the Full capacity commissioned.
3.	Upon Completion of Successful Operational Acceptance.	Final Ten percent (10%) payment shall be paid against the Operational Acceptance of the plant Facility pursuant to successful Guarantee Tests and demonstration of Performance Ratio (PR) including submission of all as-built drawings and O&M manual.

iii. For Design, Engineering, Installation, Erection, Testing and Commissioning including Performance Testing in respect of all the Equipment's Supplied and any other Services, the payment shall be made as detailed below:

Sr. No.	**Milestone/Activity**	**Payment for Works/Erection**
1.	Upon successful completion of Installation of full capacity of the plant	Eighty Percent (80%) payments shall be paid on Pro rata basis against Service Portion (Design, Engineering, Erection, Testing and Commissioning Portion) on completion of installation of equipment on certification by the Engineer-In-Charge for the quantum of work completed after successful clearance of quality check points involved in the quantum of work billed.
2.	Upon successful commissioning of full capacity of the plant	Ten Percent (10%) of the total price of Design, Engineering, Erection, Testing and Commissioning shall be paid against successful commissioning of the plant on pro rata basis for the full capacity commissioned
3.	Upon Completion of Successful Operational Acceptance.	Final Ten percent (10%) payment shall be paid against the Operational Acceptance of the plant Facility pursuant to successful Guarantee Tests and demonstration of Performance Ratio (PR) including submission of all as-built drawings and O&M manual.

C) ANNUAL MAINTENANCE PART (SOR-3)

The payment for the Annual Maintenance Contract shall be made as per the following terms and condition:

Sr. No.	Milestone/Activity	Payment for AMC
1.	On Successful AMC of the Solar PV Power Plant Year wise for 5 years and extendable for another 5 years.	AMC of the entire Project payment will be released on quarterly basis at the end of every quarter for each year till 5 (Five) years and extendable for another five (5) years. (i) Year 1: AMC -1 (ii) Year 2: AMC -2 (iii) Year 3: AMC -3 (iv) Year 4: AMC -4 (v) Year 5: AMC -5 (vi) Year 6: AMC -6 (vii) Year 7: AMC -7 (viii) Year 8: AMC -8 (ix) Year 9: AMC -9 (x) Year 10: AMC -10 In case of any default, Non-Performance or breach of contractual conditions of the AMC contract during the AMC period, the penalties/deductions, if applicable will be liable to be deducted from the Quarterly AMC payments first & then from the Contract Performance Security.

4. SCHEDULING AND FORECASTING

Scheduling and Forecasting Shall be carried out by BBMB.

5. Eligibility conditions set forth in the tender document are as per minimum 11.5 MW (AC) cumulative capacity basis only. Bidders are required to quote accordingly for

the complete cumulative capacity of minimum 11.5 MW (AC) on Lumpsum Turnkey (LSTK). However, bidders can quote cumulative capacity higher than 11.5MW (AC), based upon site survey by them prior to bid submission (minimum 10MW (AC) or higher capacity at 400kV substation, BBMB Bhiwani and minimum 1.5MW (AC) or higher capacity at 220kV substation, BBMB Hisar).

Evaluation of bid shall be carried out by per MW (AC) Price basis {Per MW (AC) Price shall be calculated by Grand Total Price of EPC (supply, mandatory spares and service) and AMC divided by quoted cumulative capacity by bidder, but minimum 11.5 MW (AC)}. E-RA shall be carried out on per MW (AC) price. The total cumulative capacity as quoted by bidder but minimum 11.5 MW (AC) shall be awarded to a single successful bidder (L1) selected after E-RA on Lumpsum Turnkey (LSTK) basis.

However, there will be separate LOA/contract agreements for Two different sites with the single successful bidder. Based on the per MW (AC) Price of L-1 bidder after e-RA, the site wise EPC and AMC Price will be calculated by multiplying the per MW (AC) Price with the respective site capacity quoted by bidder. Accordingly, 2 (Two) different EPC and AMC, Letter of Award (LOA) /Contract Agreement will be released for the respective site by the Purchaser to the single successful bidder only.

EMD will be submitted by the bidders jointly for the cumulative capacity quoted by bidder but minimum 11.5 MW (AC) . However, the successful bidder will be required to submit separate Contract Performance Security for EPC and AMC for respective solar sites i.e. at Bhiwani and Hisar.

NOTE:- NO PART COMMISSIONING IS ACCEPTABLE.

6. ANNUAL MAINTENANCE CONTRACT (AMC)

Price of AMC for evaluation of Bid shall be considered for Ten (10) years as per Schedule of Rates for AMC (SOR-3). However, initially AMC shall be placed for 5 years from date of Operational Acceptance and further extendable for another five

years at the sole discretionary of BBMB, as per the scope given in the Tender documents and on same terms and conditions and rates as per Schedule of Rates for AMC (SOR-3).

SECTION - VI

SAMPLE FORMS & FORMATS

Preamble

This Section (Section - VI) of the Bidding Documents [named as Sample Forms and Procedures (FP)] provides proforma to be used by the bidders at the time of their bid preparation and by the Contractor subsequent to the award of Contract.

The Bidder shall complete, sign and submit with its bid the relevant FORMS to be used unamended, in accordance with the requirements included in the Bidding Documents.

The Bidder shall provide the EMD, in the form included hereafter acceptable to the Purchaser, pursuant to the provisions in the instructions to Bidders.

The Performance Security (ies) forms should not be completed by the bidders at the time of their bid preparation. Only the successful Bidder will be required to provide the Performance Security(ies) according to one of the forms indicated herein acceptable to the Purchaser and pursuant to the provisions of the General and Special Conditions of Contract, respectively.

Depending on specific facts and circumstances related to the Bid/ Tender and the contract, the text of the Forms herein may need to be modified to some extent. The Purchaser reserves the right to make such modifications in conformity with such specific facts and circumstances and rectify and consequent discrepancies, if any. However, modifications, if any, to the text of the Forms that may be required in the opinion of the Bidder/ Contractor shall be affected only if the same is approved by the Purchaser. The Purchaser’s decision in this regard shall be final and binding.

LIST OF SAMPLE FORMS & FORMAT	
Annexure No.	**Description**
1	COVERING LETTER
2	BIDDER'S GENERAL INFORMATION
3	FORMAT FOR INDEMNITY BOND TO BE EXECUTED BY THE CONTRACTOR FOR THE REMOVAL / DISPOSAL OF SCRAP/DISPOSAL OF SURPLUS MATERIAL – IF APPLICABLE
4	INDEMNITY BOND TO BE EXECUTED BY THE CONTRACTOR FOR THE PLANT HANDED OVER FOR PERFORMANCE OF ITS AMC (ENTIRE SOLAR PHOTO VOLTAIC PLANT)
5	INDEMNITY BOND
6	NO DEVIATION CONFIRMATION
7	DECLARATION REGARDING BANNING AND LIQUIDATION, COURT RECEIVERSHIP ETC.
8	DECLARATION ON RESTRICTION ON PROCUREMENT FROM CERTAIN COUNTRIES: MoF OM No 6/18/2019-PPD dated 23.07.2020
9	PROFORMA OF "BANK GUARANTEE" FOR "CONTRACT PERFORMANCE SECURITY"
10	DECLARATION REGARDING THE PROCUREMENT OF SOLAR INVERTERS & SOLAR MODULES FROM CLASS I LOCAL SUPPLIERS
11	BIDDER'S EXPERIENCE
12	DISCLOSURE FOR ALMM COMPLIANCE
13	FORMAT OF CHARTERED ACCOUNTANT CERTIFICATE FOR FINANCIAL CAPABILITY OF THE BIDDER
14	E-BANKING FORMAT
15	POWER OF ATTORNEY FOR BIDDING COMPANY
16	FORMAT FOR CYBER SECURITY AGREEMENT
17	UNDERTAKING REGARDING SITE CONDITION

18	FORMAT OF BANK GUARANTEE FOR EARNEST MONEY DEPOSIT (EMD)
19	FORMAT OF INTEGRITY PACT
20	SELF-CERTIFICATION UNDERTAKING BY THE BIDDER-QUALIFICATIONS CRITERIA DOCUMENTS AND CREDENTIALS
21	TERMS AND CONDITIONS FOR E-REVERSE AUCTION
22	SECURITY DEPOSIT TO BE FURNISHED BY THE SUCCESSFUL BIDDER
23	WARRANTY DEED TO BE FURNISHED BY THE SUCCESSFUL BIDDER

ANNEXURE-1

FORMAT OF COVERING LETTER

(The Covering Letter should be submitted on the Letter Head of the Bidding Company)

Ref.No._____

Date:_____

From: _____(Insert name and address of Bidding Company)

_____

_____

Tel.#:

Fax#:

E-mail address#

To

The Chief Engineer/ Transmission System
Planning & Design (TS) Directorate
SLDC Complex, Industrial. Area Phase - 1
B.B.M.B. Chandigarh.
Telephone No. 0172- 2654468
PBX No. 0172- 2653735
Email: dirpp@bbmb.nic.in

Sub: Submission of the Tender Document No. ……

Dear Sir / Madam,

1. We, the undersigned…. [insert name of the 'Bidder'] having read, examined and understood in detail the tender Document for Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning, Mandatory Spares and associated Transmission System for Grid connected Ground mounted Solar Photovoltaic Projects of cumulative capacity minimum 11.5MW (AC) or higher as quoted by the bidder at two different locations of BBMB (minimum 10MW (AC) or higher capacity at 400kV substation, BBMB Bhiwani and minimum 1.5MW (AC) or higher capacity at 220kV substation, BBMB Hisar) on Lumpsum Turnkey (LSTK)

alongwith Annual Maintenance for five (5) years extendable for another five (5) years hereby submit our Bid comprising of Techno-Commercial Bid and Price Bid. We confirm that neither we nor any of our Parent Company/ Affiliat / Ultimate Parent Company has submitted Bid other than this Bid directly or indirectly in response to the aforesaid tender.

2. We give our unconditional acceptance to the tender, dated and tender documents attached thereto, issued by BBMB, as amended. As a token of our acceptance to the tender documents, the same have been initialed by us and enclosed to the Bid. We shall ensure that we execute such tender documents as per the provisions of the tender and provisions of such tender documents shall be binding on us.
3. We have submitted non-refundable Tender document Fee …….(Insert Amount).
4. Earnest Money Deposit

   We have enclosed an Earnest Money Deposit of INR..... (*Insert Amount*), in the form of bank guarantee no……. (*Insert reference of the bank guarantee*) dated ..... (*Insert date of bank guarantee*) as per Annexure - 18 from ..... (*Insert name of Bank providing BG*) and valid up to and including ……. in terms of Clause …… of this tender.
5. We have submitted our Price Bid strictly as per this tender, without any deviations, conditions and without mentioning any assumptions or notes for the Price Bid in the said format(s).
6. In case we are a Successful Bidder, we shall furnish a declaration at the time of commissioning of the Project to the affect that neither we have availed nor we shall avail in future any Incentive other than received from BBMB for implementation of the project.
7. Acceptance

   We hereby unconditionally and irrevocably agree and accept that the decision made by BBMB in respect of any matter regarding or arising out of the tender shall be binding on us. We hereby expressly waive any and all claims in respect of Bid process.

   We confirm that there are no litigations or disputes against us, which materially affect our ability to fulfil our obligations with regard to execution of projects by us.

8. Familiarity with Relevant Indian Laws & Regulations

We confirm that we have studied the provisions of the relevant Indian laws and regulations as required to enable us to submit this Bid and execute the tender documents, in the event of our selection as Successful Bidder. We further undertake and agree that all such factors as mentioned in tender have been fully examined and considered while submitting the Bid.

9. Contact Person

Details of the contact person are furnished as under:

Name : ……

Designation : ……...

Company : ……

Address : ……

Phone Nos. : ……

Fax Nos. : ……

E-mail address : ……

10. We are enclosing herewith the Envelope-I (Covering Letter, Tender document Fees, EMD etc through Offline and Online, Techno-Commercial documents through online as per clause no. 11.1of Section - II, ITB) and Envelope II (Price Bids) (through online) containing duly signed formats, each one duly sealed separately, in one original as desired by you in the tender for your consideration as per clause no. 11.0 of Section - II, ITB.

    It is confirmed that our Bid is consistent with all the requirements of submission as stated in the tender and subsequent communications from BBMB. The information submitted in our Bid is complete, strictly as per the requirements stipulated in the tender and is correct to the best of our knowledge and understanding. We would be solely responsible for any errors or omissions in our Bid. We confirm that all the terms and conditions of our Bid are valid for acceptance for a period as specified in BDS from the date of opening of "Techno-Commercial/ Un-priced Bid". We confirm that we have not taken any deviation so as to be deemed non-responsive.

Dated the_____ day of_____ 20….

Thanking you,
We remain,
Yours faithfully,

Name, Designation and Signature of Authorized Person in whose name Power of Attorney/ Board Resolution/ Declaration. Copy of Power of Attorney/ Board Resolution/ Declaration should be enclosed along with Covering Letter.

ANNEXURE-2

BIDDER'S GENERAL INFORMATION

(To be submitted on the Letter Head of the Bidding Company)

Sr. No.	Description	Remarks
1	Name of the Bidder	
2	Status of the Firm	
3	Mailing Address of Registered Office	
4	Mailing Address of Operation Office	
5	E-mail	
6	Web site	
7	Authorized Contact Person(s) with Name, Designation, Address and Mobile Phone No., E- mail address / Fax No. to whom all references shall be made	
8	Year of Incorporation	
9	Number of Years in Operation	
10	ISO Certification Yes/No	
11	Name of the Banker	
12	Branch Details of Bank	
13	Type of Account with Account Number	
14	IFSC Code	
15	Permanent Account Number (PAN) of the Bidder	**(Copy of PAN Card to be submitted)**
16	Goods and Service Tax registration No.	**GST ID (Proof to be submitted**
17	PF Registration Number with Details	**(Copy of Registration to be submitted)**
18	ESI Registration Number with Details	**(Copy of Registration to be submitted)**
19	Have the Bidder/ Company ever been debarred byany Govt. Dept./ Undertaking for undertaking any work	Yes/No *(If answer is YES, please provide details)*

20	Reference of any document information attached by the Bidder other than specified in the tender.	
21	Whether company is MSME as on the bidding date	Yes/No

(Signature of Authorized Signatory)

With Stamp

ANNEXURE-3

Indemnity Bond to be executed by The Contractor for The Removal / Disposal of Scrap/Disposal of Surplus Material

(TO BE EXECUTED ON STAMP PAPER OF APPROPRIATE VALUE)

INDEMNITY BOND

This INDEMNITY BOND executed this …… day of ……. 20…... by ….....(Name of Company) ……..., a Company registered under the Companies Act, 1956/2013 Concern and having its registered office(s) at ……..(Office Address)……, hereinafter called the Indemnifier(s)/ Contractor(s) (which expression shall, unless excluded by or repugnant to the context, be deemed to mean and include its successors, administrators, executors and permitted assigns).

IN FAVOUR OF

M/s……..., having its registered office at……..(hereinafter referred to as "…..")

1. ……. has awarded the Contractor(s), contract for execution of work ("Scope of Work") as mentioned in the LOA/contract agreement no…….. dated ....., entered into between M/s and Contractor(s), relating to ……..(Name & Address of Project/Station)… (hereinafter called 'the Project').
2. The Indemnifier(s) for the purpose of execution of its Scope of Work had from time to time procured and stored ……..(Details of Material) at the Project Site.
3. After completion of the Scope of Work by Indemnifier(s), it has been identified that scrap …… (Details of Scrap Material & its Quantity)……..and/or surplus …… (Details of Surplus Material & its Quantity) belonging to Indemnifier(s) is lying at the said Project Site.
4. Now, the scrap …… (Details of Scrap Material & its Quantity) and/or surplus …… (Details of Surplus Material & its Quantity)…….. belonging to the Indemnifier(s), requiresto be removed by Indemnifier(s) from the Project Site.

NOW THEREFORE THIS INDEMNITY BOND WITNESSETH AS UNDER:

1. That Indemnifier(s) by way of this indemnity requests M/s……. to issue approval in favour of Indemnifier(s) for removal of scrap ……(Details of Scrap Material & its Quantity) and/or surplus ……(Details of Surplus Material & its Quantity)..... belonging to

2. That the Indemnifier(s) shall ensure clearing of its scrap.....(Details of Scrap Material & its Quantity)……..and/or surplus …… (Details of Surplus Material & its Quantity).....by itself, as aforesaid.

3. That Indemnifier(s) in consideration of the premises above, for itself and its respective, executors, administrators and assigns, jointly and severally agree and undertake from time to time and at all times hereafter to indemnify M/s….. and keep M/s…….. indemnified from and against all claims, demands, actions, liabilities and expenses which may be made or taken against or incurred by M/s….. by reason of the issue of necessary approval by M/s…….. and permitting Indemnifier(s) to remove scrap ……(Details of Scrap Material & its Quantity) and/or surplus ……(Details of Surplus Material & its Quantity).....belonging to Indemnifier(s), from the project.

4. That Indemnifier(s) undertakes to indemnify and keep M/s… harmless from any act of omission or negligence on the part of the Contractor in following the statutory requirements with regard to removal/disposal of scrap and surplus belonging to Indemnifier(s), from the Project Site aforesaid, by the Indemnifier(s). Further, in case the laws require M/s…… to take prior permission of the relevant Authorities before handing over the scrap and/or surplus to the Indemnifier, the same shall be obtained by the Indemnifier on behalf of M/s……..

IN WITNESS WHEREOF, the Indemnifier(s), through its authorized representative, has executed these presents on the Day, Month and Year first mentioned above at

……(Name of the Place)……

Witness:

Indemnifier

1. ……

2. ……..

(Authorised Signatory)

ANNEXURE - 4

INDEMNITY BOND TO BE EXECUTED BY THE CONTRACTOR FOR THE PLANT HANDED OVER FOR PERFORMANCE OF ITS AMC (ENTIRE SOLAR PHOTO VOLTAIC PLANT)

(TO BE EXECUTED ON STAMP PAPER OF APPROPRIATE VALUE)

INDEMNITY BOND

THIS INDEMNITY BOND IS made this.....day of…….20……. By ……..... a Company registered under the Companies Act, 1956/2013 concernhaving its Registered Office at ……. (herein after called as "Contractor" or "Obligor" which expression shall include its successors and permitted assigns)in favour of M/s…., a Company incorporated under the Companies Act, 1956 having its Registered Office at …… and its Project at .....(hereinafter called "M/s… " which expression shall include its successors and assigns) :

WHEREAS M/s….. has awarded to the Contractor a Contract for.....vide its Letter of Award (LOA)/Contract Agreement No……dated and its Amendment No.....(Applicable when amendments have been issued) (hereinafter called the "Contract") in terms of which M/s…. is required to hand over various Equipment and facilities provided under Supply & Service Contract , herein after called "Solar Photo Voltaic Plant" to the Contractor for execution of the Contract.

AND WHEREAS, The Contractor is required to execute an Indemnity Bond in favour of M/s……for the Solar Photo Voltaic Plant handed over to it by M/s……. for the purpose of Performance of the Contract/AMC portion of the Contract.

NOW, THEREFORE, this Indemnify Bond witnesseth as follows:

1. That in consideration of Solar Photo Voltaic Plant as mentioned in the Contract, Valued at Rs.....#..... (Rupees.....) handed over to the Contractor for the purpose of Performance of the Contract, the Contractor hereby undertakes to indemnify and shall keep M/s… indemnified, for the full value of the Solar Photo Voltaic Plant. The Contractor hereby acknowledges actual receipt of the Solar Photo

Voltaic Plant as detailed in the Schedule appended hereto.

2. That the Contractor is obliged and shall remain absolutely responsible for the safe AMC/protection of the Solar Photo Voltaic Project against all risks whatsoever till completion of AMC Contract in accordance with the terms of the Contract and is taken over by M/s….. The Contractor undertakes to keep M/s……. harmless against any loss or damage that may be caused to the Solar Photo Voltaic Plant.

3. The Contractor undertakes that the Solar Photo Voltaic Plant shall be used exclusively for the Performance/execution of the Contract strictly in accordance with its terms and conditions and no part of the Solar Photo Voltaic Plant shall be utilised for any other work or purpose whatsoever. It is clearly understood by the Contractor that no-observance of the obligations under this Indemnify Bond by the Contractor shall inter-alia constitute a criminal breach of trust on the part of the Contractor for all intents and purposes including legal/penal consequences.

4. That M/s…. is and shall remain the exclusive Purchaser of the Solar Photo Voltaic Plant free from all encumbrances, charges or liens of any kind, whatsoever. The Solar Photo Voltaic Plant shall at all times be open to inspection and checking by Engineer-in-Charge/Engineer or other employees /agents authorised by him in this regard. Further, M/s… shall always be free at all times to take possession of the Solar Photo Voltaic Plant in whatever form the Solar Photo Voltaic Plant may be, if in its opinion, the Solar Photo Voltaic Plant are likely to be endangered, mis-utilised or converted to uses other than those specified in the Contract, by any acts of omission of commission on the part of the Contractor or any other person or on account of any reason whatsoever and the Contractor binds itself and undertakes to comply with the directions of demand of M/s… to return the Solar Photo Voltaic Plant without any demur or reservation.

5. That this Indemnify Bond is irrevocable. If at any time any loss or damage occurs to the Solar Photo Voltaic Plant or the same or any part thereof is mis- utilised in any manner whatsoever, then the Contractor hereby agrees that the decision of the Engineer-in- Charge/Engineer of M/s…. as to assessment of loss or damage to the Solar Photo Voltaic Plant shall be final and binding on the Contractor. The Contractor binds itself and undertakes to replace the lost and/or damaged Solar Photo Voltaic Plant at its own cost and / or shall pay the amount of loss to M/s…. without any demur, reservation or protest. This is without prejudice to any other right or remedy that may be available to M/s…. against the Contractor under the Contract

and under this Indemnify Bond.

6. NOW THE CONDITION of this Bond is that if the Contractor shall duly and punctually comply with the terms of and conditions of this Bond to the satisfaction of M/s…, THEN, the above Bond shall be void, but otherwise, it shall remain in full force and virtue.

   IN WITNESS WHEREOF, the Contractor has hereunto set its hand through its authorised representative under the common seal of the Company, the day, month and year first above mentioned SCHEDULE

WITNESS

For and on behalf of

M/s. .....

1. Signature…… Name ……

2. Name ……. Signature ……..

3. Address …….. Designation …….

Authorised representative*

1. Signature ----------

2. Name ---------- Common Seal
   (In case of Company)

3. Address

* Indemnity Bonds are to be executed by the authorised persons and (i) In case of contracting Company under common seal of the Company of (ii) having the power of attorney issued under common seal of the company with authority to execute Indemnity Bonds, (iii) In case (ii) the original Power of Attorney if it is specifically for our contract or a Photostat copy of the Power of Attorney if it is a General Power of Attorney and such documents should be attached to Indemnity Bond.

ANNEXURE - 5

(TO BE EXECUTED ON STAMP PAPER OF APPROPRIATE VALUE)

INDEMNITY BOND

THIS INDEMNITY BOND IS made this..... day of ..... 20..... by M/s……., a Company registered under the Companies Act, 1956/ having its Registered Office at …….. (hereinafter called as "Contractor" or "Obligor" which expression shall include its successors and permitted assigns) in favour of M/s , and its Project at……hereinafter called "…….." which expression shall include its successors andassigns) :

WHEREAS ……. has awarded to the Contractor a Contract ……..vide its LOA No …….Dated…….. & Contract Agreement No……..dated…….. executed on …….. (hereinafter called the "Contract").

NOW, THEREFORE, this Indemnify Bond witnesseth as follows:

1. That in consideration of Solar Photo Voltaic Plant as mentioned in the Contract, total valued atRs. …… (Rupees .....only), valued as a summation of the referred contracts and handed over to the Contractor for the purpose of Performance of the Contract (s), the Contractor hereby undertakes to indemnify and shall keep M/s .....and their authorized representatives, indemnified, for the full value of the Solar Photo Voltaic Plant during the tenure of this contract or its extension if agreed to.

2. Contractor confirms that they are aware of all the contractual obligations regarding payment to all personnel and labours including that of the sub – vendors & sub – contractors of Contractor, involved in this project., as well as various contractual, statutory and non – statutory obligations as per legal requirements and have complied with the obligations to the best of information andknowledge.

3. Contractor also confirms, that they are in compliance of all the provisions and requirements, including but not limited to, the following acts/ laws/ provisions and

other applicable statutoryand non-statutory regulations:

a. Contract Labor (Regulation & Abolition) Act 1970
b. Wages Act 1936
c. Minimum Wages Act 1948
d. Employer's Liability Act 1938
e. Workmen's Compensation Act 1923
f. Industrial Dispute Act 1947
g. Maturity Benefit Act 1961
h. Mines Act 1952
i. Employees State Insurance Act 1948.

4. Contractor, hereby confirm, that in the event any contractual or statutory obligation is found to be deficient in compliance or found non-complied, Contractor will indemnify M/s…..... and take necessary actions to comply with the same within the permissible time period.

5. Contractor also confirms, should there be any charges or penalty, of any kind imposed on M/s…. or its authorized representatives, for non-compliance of legal or statutory requirements by Contractor during its tenure of the contract, Contractor agrees to indemnify M/s .....against all damages, libel or suit, in full for the same on raising such a demand by M/s…and promises to pay the same within 30 days.

6. We do further undertake that this above stated warranty is inclusive of materials and labour.

7. That the Contractor is obliged and shall remain absolutely responsible for the safe AMC/ protection of the Solar Photo Voltaic Project against all risks whatsoever till completion of AMC Contract in accordance with the terms of the Contract. The Contractor undertakes to keep BBMB harmless against any loss or damage that may be caused to the Solar Photo Voltaic Plant.

IN WITNESS WHEREOF, the Contractor has hereunto set its hand through its authorized representative under the common seal of the Company, the day, month and year first above mentioned

(_____)

Designation: Name:

Date:

(Authorized Representative)

ANNEXURE - 6

NO DEVIATION CONFIRMATION

(To be submitted on the Letter Head of the Bidding Company)

Ref.No._____ Date:_____

From:_____(Insert name and address of Bidding Company)

_____

_____

Tel.#:

Fax#:

E-mail address#

To

The Chief Engineer/ Transmission System
Planning & Design (TS) Directorate
SLDC Complex, Industrial. Area Phase - 1
B.B.M.B. Chandigarh.
Telephone No. 0172- 2654468
PBX No. 0172- 2653735
Email: dirpp@bbmb.nic.in

Sub: No Deviation Certificate regarding- Response to the Tender No ……. dated …….for the tender for ……

Dear Sir / Madam,

We understand that any 'deviation/ exception' in any form may result in rejection of bid. We, therefore, certify that we have not taken any 'exception/ deviation' anywhere in the bid and all subsequent clarifications and we agree that if any 'deviation/ exception' is mentioned or noticed, our bid may be rejected.

Place: [Signature of Authorized Signatory of Bidder]

Date: Name:

Designation:

Seal:

ANNEXURE - 7

DECLARATION REGARDING BANNING, LIQUIDATION, COURT RECEIVERSHIP ETC.

(To be submitted on the Letter Head of the Bidding Company)

Ref.No._____ Date:

From:_____(Insert name and address of Bidding Company)

_____

_____

Tel.#:

Fax#:

E-mail address#

To

The Chief Engineer/ Transmission System
Planning & Design (TS) Directorate
SLDC Complex, Industrial. Area Phase - 1
B.B.M.B. Chandigarh.
Telephone No. 0172- 2654468
PBX No. 0172- 2653735
Email: dirpp@bbmb.nic.in

Sub: Response to the Tender No …… dated ……..for the tender for……..……

Dear Sir / Madam,

We hereby confirm that we are not on Banning List or banned by BBMB or BBMB Partner States (Punjab, Haryana, Himachal Pradesh, Rajasthan and Chandigarh) / Ministry of New & Renewable Energy (MNRE) / Government department/ Public Sector due to “poor performance” or “corrupt and fraudulent practices” or any other reason on due date of submission of bid.

We also confirm that we are not under any liquidation, court receivership or similar proceedings or 'bankruptcy'.

In case it comes to the notice of BBMB that we have given wrong declaration in this regard, the same shall be dealt as ‘fraudulent practices’ and action shall be initiated as per contract agreement.

Further, we also confirm that in case there is any change in status of the declaration prior to award of contract, the same will be promptly informed to BBMB by us.

Place:	[Signature of Authorized Signatory of Bidder]
Date:	Name:
	Designation:
	Seal:

ANNEXURE - 8

DECLARATION

RESTRICTION ON PROCUREMENT FROM CERTAIN COUNTRIES:

MoF OM No 6/18/2019-PPD dated 23.07.2020

(This should be submitted on the Letter Head of the Bidding Company)

Ref.No._____ Date: _____

From:_____*(Insert name and address of Bidding Company*)

_____

_____

Tel.#: Fax#:

E-mail address#

To

The Chief Engineer/ Transmission System
Planning & Design (TS) Directorate
SLDC Complex, Industrial. Area Phase - 1
B.B.M.B. Chandigarh.
Telephone No. 0172- 2654468
PBX No. 0172- 2653735
Email: dirpp@bbmb.nic.in

Sub: Response to the Tender No …… dated ……..for the tender for……

Dear Sir/ Madam,

This is with reference to attached order No. O M no. 6/18/2019-PPD dated 23rd July 2020 issued By Department of Expenditure, MoF, Govt of India.

Bidders are required to submit the relevant Declaration 1 And/or 2. Kindly provide the relevant declaration(s) pertaining to you.

We are hereby submitting the following declaration in this regard:
Any Bidder from a country which shares a land border with India will be eligible to bid in this tender only if bidder is registered with the Competent Authority which is the Registration Committee constituted by the Department for Promotion of Industry &

Internal Trade (DPIIT) in line with the MoF OM No 6/18/2019-PPD dated 23.07.2020. Further the successful bidder shall not be allowed to subcontract supplies/services/works to any “Sub-contractor” under “Service Part” from a country which shares a land border with India unless such Subcontractor is registered with the competent as mentioned above.

The Contractor shall not be allowed to sub-contract works to any sub-contractor/ sub-vendor from a country which shares a land border with India unless such sub-contractor is registered with the competent Authority. However, the same shall not be applicable for “Supply Part”.

However, the said requirement of registration will not apply to bidders/sub- contractors from those countries (even if sharing a land border with India) to which the Government of India has extended lines of credit or in which the Government of India is engaged in development projects. Bidders may apprise themselves of the updated lists of such countries available in the website of the Ministry of External Affairs.

Declaration 1:
Certification for Tenders

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this bidder fulfils all requirements in this regard and is eligible to be considered. Where applicable, evidence of valid registration by the Competent Authority shall be attached]."

And
Declaration 2:
Certification for Tenders for Works involving possibility of sub-contracting (Applicable for Service Part)

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries; I certify that this bidder is not from such a country or, if from such a country,

has been registered with the Competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. I hereby certify that this bidder fulfils all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached]."

We further declare that the above statement is true & correct. We are aware that if at any stage it is found to be incorrect, our response to the tender will be rejected.

Dated the_____ day of_____, 20….

Thanking you,

We remain,
Yours faithfully,

Name, Designation, Seal and Signature of Authorized Person in whose name Power of Attorney/ Board Resolution/ Declaration.

ANNEXURE - 9

PERFORMANCE BANK GUARANTEE

(SUPPLY & SERVICE PART)

(TO BE EXECUTED ON THE APPROPRIATE VALUE OF NON-JUDICIAL STAMPED PAPERS)

This agreement is made this _____day of _____between M/S (Banker's Name)_____through a company registered under the Companies Act, 1956/Banking Statute/ a body corporate constituted under the Banking Companies (Acquisition and Transfer of undertaking) Act V or 1970 having its registered office at _____hereinafter called the "Guarantor" which expression shall unless repugnant to the context or meaning thereof include its successors and assigns of the first part, M/S _____through (designation of the person signing The Bank Guarantee _____(on behalf of the supplier) a company registered under companies Act, 1956, having its registered office at (Address of Registered office_____) hereinafter called the "Supplier" which expression shall unless repugnant to the context or meaning thereof include its successors and assigns of the second part and the Bhakra Beas Management Board, Chandigarh through Chief Engineer/TS, a statutory body constituted under Section 79 (1) read with Section-80 (6) of the Punjab Re-organization Act, 1966 hereinafter called the 'Board' which expression shall unless repugnant to the context or meaning thereof include its successors and assigns of the third part.

Whereas the Contractor had, interalia, agree to supply/service to the BBMB _____ (hereinafter called the "said equipment) on the terms and conditions contained in the LOA _____ dated _____ (hereinafter called the "said LOA") Placed by the BBMB on the contractor and unconditionally accepted by the contractor.

And whereas under clause 24 **of Section IV (GCC) of BBMB** Specifications of the said LOA, the contractor is required to furnish a Bank Guarantee for a sum ₹_____Rupees_____ _ being the 10% of the contract price on account of retention money, which but for this guarantee would be withheld by the BBMB till such time that the said equipment is received in good condition by the BBMB and in accordance with the specifications of the same and the said equipment has given satisfactory performance as per Clause

no. 24 of Section IV (GCC) of BBMB Specifications in the said LOA and also till such time that any claim of the BBMB is pending against the contractor, to guarantee the payment of the retention money on bill submitted against supply/service of the said material and service on order from time to time up to a maximum amount of the sum of Rs._____ (Rupees _____)

And whereas at the request on the contractor the BBMB has agreed not to retain 10% of the contract price of all the consignments and in lieu thereof to accept a Bank Guarantee equivalent to the 10% of the contract price of all the consignments from the guarantor for the aforesaid purposes & for the due performance of the said LOA by the contractor on the terms & conditions hereinafter contained, this deed, witnesseth and it is hereby agreed by and between the parties hereto as follows: -

The Guarantor hereby guarantees to the BBMB the quality, workmanship and design of the said material in accordance with the prescribed specifications and the terms of the said LOA and that the said material and service when received by the BBMB shall be in good condition and shall give satisfactory performance as per Clause no. 24 of section IV (GCC) **of BBMB Specifications** in the said LOA and agrees to indemnify and keep indemnified the BBMB to the extent of ₹_____in the aggregate against all losses, damages, cost, charges and expenses which may be suffered or incurred by the BBMB on account of non-receipt of the said equipment and services in good condition or on account of any defect in the said material and services or on account of any breach or breaches on the part of the contractor of any of the terms and conditions of the said LOA in the supply/services of and during the warranty period of the said material. The guarantor further agrees that the BBMB shall be the sole judge whether or not the supplies/services have been made according to the prescribed specifications, design and workmanship and laid down in the said LOA and whether or not the said material and services has been received in good condition by the BBMB and whether or not the said material and services has given satisfactory performance during its warranty period and whether or not the contractor has committed breach or breaches of any of the terms and conditions of the said LOA and the extent of loss, damages, cost, charges or expenses suffered or incurred by BBMB on account thereof. The guarantor hereby guarantees and undertakes to release & pay immediately the amount of ₹_____to the BBMB on receipt of written instructions from the BBMB and the contractor shall not have any right or cause to interfere. All rights to get

the Bank Guarantee encashed shall rest with the BBMB solely at its discretion without assigning any reason whatsoever.

The guarantor further agrees that this guarantee shall remain in full force and effect as per clause 24 of Section IV **(**GCC**)** of BBMB Specifications in the said LOA and also till such time any claim of BBMB is pending against the supplier. The guarantor also agrees and undertakes not to revoke this guarantee before the same is discharged as aforesaid except with the previous consent of BBMB in writing.

The Guarantor hereby further agrees that BBMB shall have the fullest liberty without affecting in any manner obligation of the guarantor hereunder with or without the consent of the guarantor to vary any of the terms of the said LOA or to extend time of performance of the said LOA by the contractor from time to time or to postpone for any time or from time to time any of the powers exercise-able by BBMB against the contractor and either to forebear or enforce any of the terms or conditions relating to the said LOA and the Guarantor shall not be relieved from his liability by reason of any variations or any extension being granted to the contractor or for any forbearance, act or commission on the part of BBMB, or any indulgence by BBMB to the contractor or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving the guarantor, nor would it be necessary for BBMB to sue the contractor before suing the said guarantor for the amount/damages due under this deed of guarantee.

The guarantor hereby further affirms and declares that this guarantee has been executed by their lawfully constituted attorney legally competent to sign and execute and has been stamped as required for such guarantees under the relevant Act of the State in which it has been executed and signed and the guarantee herein before contained shall not be affected by any change in the Constitution of the Guarantor (Bank) or the Constitution of the contractor.

The Guarantor hereby further agrees that any claim or dispute arising under this deed shall fall within the exclusive jurisdiction of courts at Chandigarh.

Notwithstanding, anything herein before contained the Guarantor's liability under this guarantee is restricted to ₹_____ (Rupees_____). The guarantee shall remain valid upto. Unless claim in writing is presented to the guarantor within six months from that date and if unpaid, a suit or action to enforce such claim under this guarantee is filed against the guarantor within said period of six months,

all the rights of BBMB under the said guarantee shall be forfeited and the guarantor shall be released and discharged from all liability there under.

In witness whereof the parties hereto have put their perspective hands on the day and the year first above mentioned.

Witness: For & on behalf of the Guarantor:

1. Signatures:_____

2. Name & Designation_____

Witness: For and on behalf of the Supplier.

1. Signatures:_____

2. Name& Designation_____

Witness: For and on behalf of the BBMB.

1. Signatures:_____

2. Name & Designation_____

ANNEXURE - 10

DECLATION REGARDING THE MANDATORY PROCUREMENT OF SOLAR MODULES & INVERTERS FROM CLASS I LOCAL SUPPLIERS

(To be submitted on the Letter Head of the Bidding Company)

Reference: Ministry of New & Renewable Energy (MNRE) Order No 283/22/2019-GRID SOLAR dated 23rd Sep 2020 & any amendments thereof, for the Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content) in respect of Renewable Energy (RE) Sector.

Reference 2: Department for Promotion of Industry and Internal Trade (DPIIT) Notification No. P-45021/2/2017-PP (BE-II) dated 4th June, 2020.

Ref.No. Date:

To

The Chief Engineer/ Transmission System
Planning & Design (TS) Directorate
SLDC Complex, Industrial. Area Phase - 1
B.B.M.B. Chandigarh.
Telephone No. 0172- 2654468
PBX No. 0172- 2653735
Email: dirpp@bbmb.nic.in

Sub: Response to the Tender No …… dated……..for the tender for ……

Dear Sir/ Madam,

We hereby confirm that in line with the mandate of Ministry of New & Renewable Energy (MNRE) Order No 283/22/2019-GRID SOLAR dated 23rd Sep 2020 for the Public Procurement (Preference to Make in India) & any amendments thereof, to provide for Purchase Preference (linked with local content) in respect of Renewable Energy (RE) Sector & Department for Promotion of Industry and Internal Trade (DPIIT) Notification No. P-45021/2/2017-PP (BE-II) dated 4th June, 2020, we hereby declare that:

a) The procurement of Solar Modules for the subject tender will be done from Class I

Local suppliers only.

b) The procurement of Solar Inverters for the subject tender will be done from Class I Local suppliers only.

   i. The percentage of Local content in the procurement of mentioned Solar Modules is……..% (In words).

   ii. The percentage of Local content in the procurement of mentioned Solar Inverters is……..% (In words).

   iii. A Class-I local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, has local content equal to or more than 50%, as defined under the above said Orders.

False declaration will be in the breach of the code of integrity under Rule 175(1)(i)(h) of the General Financial rules for which a bidder or its successors can be debarred for up to two years as per rule 151 (iii) of the general financial rules along with such other actions as may be permissible under the law.

Also, in case it comes to the notice of BBMB that we have given wrong declaration in this regard, the same shall be dealt as 'wrong declaration under fraudulent practices and action shall be initiated as per the Procedure for action as per bidding documents including forfeiture of EMD , Performance Security and black listing etc.

(Signature and stamp (on each page) of Authorized Signatory of Bidding Company.

Name: …….

Date: ……

Place: …….

ANNEXURE - 11

BIDDER'S EXPERIENCE

(To be submitted on the Letter Head of the Bidding Company)

Ref. No. _____ Date: _____

From:_____(*Insert name and address of Bidding Company*)

Tel.#: Fax#:

E-mail address#

To

The Chief Engineer/ Transmission System
Planning & Design (TS) Directorate
SLDC Complex, Industrial. Area Phase - 1
B.B.M.B. Chandigarh.
Telephone No. 0172- 2654468
PBX No. 0172- 2653735
Email: dirpp@bbmb.nic.in

Sub: Response to the Tender No …… dated ……..for the tender for……

Dear Sir / Madam,

Sl. No	Description of the Services	LOA /WO No. and date	Full Postal Address & phone nos. of Client. *Name, designation and address of Engineer/ Officer-in-Charge (for cases other than purchase)*	Value of Contract/ Order (*Specify* Currency Amount)	Date of Commencement of Services	Scheduled Completion Time (Months)	Date of Actual Completion	Reasons for delay in execution, if any
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)

Place:

Date:

[Signature of Authorized Signatory of Bidder]

Name:

Designation:

Seal:

ANNEXURE - 12

FORMAT FOR DISCLOSURE FOR ALMM COMPLIANCE

[On the letter head of Bidding Company]

Disclosure

Ref. No.____ Date: _____

From: (Insert name and address of Bidding Company)

_____

_____

To

The Chief Engineer/ Transmission System
Planning & Design (TS) Directorate
SLDC Complex, Industrial. Area Phase - 1
B.B.M.B. Chandigarh.
Telephone No. 0172- 2654468
PBX No. 0172- 2653735
Email: dirpp@bbmb.nic.in

Sub: Response to the Tender No …… dated ……..for the tender for……

Dear Sir/ Madam,

We declare that we are fully aware of the binding provisions of the ALMM Order and the Lists(s) thereunder, while quoting the for the subject tender of Tender for Design, Engineering, Procurement & Supply, Construction & Erection, Testing, Commissioning, Mandatory Spares and associated Transmission System for Grid connected Ground mounted Solar Photovoltaic Projects of cumulative capacity minimum 11.5MW (AC) or higher as quoted by the bidder at two different locations of BBMB (minimum 10MW (AC) or higher capacity at 400kV substation, BBMB Bhiwani and minimum 1.5MW (AC) or higher capacity at 220kV substation, BBMB Hisar) on Lumpsum Turnkey (LSTK) alongwith Annual Maintenance for five (5) years extendable for another five (5) years.

We further understand that the List-I (Solar PV Modules) of ALMM Order, Annexure-I of

the OM, issued by MNRE on 10th March, 2021 will be updated by MNRE from time to time. We also understand that the Modules to be procured for this project, shall be from the List-I of the ALMM Order applicable on the date of invoicing of such modules.

We also further understand and accept that we shall be liable for penal action, including but not limited to blacklisting and invocation of Performance Bank Guarantee, if we are found not complying with the provisions of ALMM Order, including those mentioned above.

Dated the___day of_____, 20….

Thanking you,
Yours faithfully,
Name, Designation, Seal and Signature of Authorized Signatory

ANNEXURE - 13

FORMAT OF CHARTERED ACCOUNTANT CERTIFICATE FOR FINANCIAL CAPABILITY OF THE BIDDER

(To be submitted on the Letter Head of the Chartered Accountant)

Ref.No._____ Date: _____

To

The Chief Engineer/ Transmission System
Planning & Design (TS) Directorate
SLDC Complex, Industrial. Area Phase - 1
B.B.M.B. Chandigarh.
Telephone No. 0172- 2654468
PBX No. 0172- 2653735
Email: dirpp@bbmb.nic.in

Sub: Response to the Tender No …… dated ……..for the tender for……

Dear Sir/ Madam,

We have verified the Annual Accounts and other relevant records of M/s… (Name of the bidder) and certify the following

Further, we certify that the Financially Evaluated Entity (ies) had an Annual Turnover

A. ANNUAL TURNOVER OF LAST 3 YEARS:

Year	Amount (Currency)
Year 1:	
Year 2:	
Year 3:	

And

Net worth (strike out whichever is not applicable) of INR……. Crore computed as per instructions provided in this tender based on unconsolidated audited annual accounts as per last FY.

B. FINANCIAL DATA FOR LAST AUDITED FINANCIAL YEAR:

Description	Year ____
	Amount (Currency)
1. Current Assets	
2. Current Liabilities	
3. Working Capital (Current Assets-Current liabilities)	
4. Net Worth (As mentioned underAnnexure to BDS)	

Yours faithfully

(Signature and stamp (on each page) of Authorized Signatory of Bidding Company)

Name: …….

Date: …….

Place: …….

Signature and stamp (on each page) of Chartered Accountant/Statutory Auditors of Bidding Company.

Name: …….

Date: …….

Place: …….

Notes:

Audited consolidated annual accounts of the Bidder may also be used for the purpose of financial criteria provided the Bidder has at least 50% equity in each company whose accounts are merged in the audited consolidated accounts and provided further that the financial capability of such companies (of which accounts are being merged in the consolidated accounts) shall not be considered again for the purpose of evaluation of the Bid.

ANNEXURE - 14

e-BANKING FORMAT

(To be submitted on the Letter Head of the Bidder)

1. Bidder Name :
2. Bidder Code :
3. Bidder Address :
4. Bidder E-mail ID :
5. Particulars of Bank Account
   a) Name of Bank :
   b) Name of Branch :
   c) Branch Code :
   d) Address :
   e) Telephone Number :
   f) Type of Account :
   g) Account Number :
   h) RTGS IFSC Code :
   i) NEFT IFSC Code :
   j) 9 digit MICR code :

I/ We hereby authorize BBMB to release any amount due to me/ us in the bank account as mentioned above. I/ We hereby declare that the particulars given above are correct and complete. If the transaction is delayed or lost because of incomplete or incorrect information, we would not hold the BBMB responsible.

(Signature of Vendor/ Customer)

BANK CERTIFICATE

We certify that ---------- has an Account no with us and we confirm that the details given above are correct as per our records.

Bank stamp

Date (Signature of authorized officer of bank)

ANNEXURE - 15

POWER OF ATTORNEY FOR BIDDING COMPANY

(To *be stamped in accordance with Stamp Act, the Non-Judicial Stamp Paper of Appropriate Valueshould be in the name of the Bidder***)**

Know all men by these presents, We name and address of the registered office of the Bidding Company as applicable) do hereby constitute, appoint and authorize Mr./Ms. ……. (name & residential address) who is presently employed with us and holding the position ofas our true and lawful attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to submission of our Bid for …… (insert details of Tender) in response to the Tender No…… dated issued by BBMB, including signing and submission of the Bid and all other documents related to the Bid, including but not limited to undertakings, letters, certificates, acceptances, clarifications, guarantees or any other document which the BBMB may require us to submit. The aforesaid Attorney is further authorized for making representations to the BBMB and providing information/ responses to BBMB, representing us in all matters before BBMB and generally dealing with BBMB in all matters in connection with Bid till the completion of the bidding process as per the terms of the above-mentioned Tender.

We hereby agree to ratify all acts, deeds and things done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall be binding on us and shallalways be deemed to have been done by us.

All the terms used herein but not defined shall have the meaning ascribed to such terms under the Tender.

Signed by the within named

…….. (Insert the name of the executant company) through the hand of
Mr. ……

duly authorized by the Board to issue such Power of Attorney

Dated this …… day of ……
Accepted

……..

Signature of Attorney

(Name, designation and address of the Attorney)

Attested

…… (Signature of the executant)

(Name, designation and address of the executant)

……

Signature and stamp of Notary of the place of execution

Common seal of …… has been affixed in my/ our presence pursuant to Board of Director's Resolution dated……

WITNESS

1. ……..(Signature)

   Name……

   Designation ……

2. …….(Signature)

   Name……

   Designation ……

Notes:

The mode of execution of the power of attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the

executant(s) and the same should be under common seal of the executant affixed in accordance with the applicable procedure. Further, the person whose signatures are to be provided on the power of attorney shall be duly authorized by the executant(s) in this regard.

The person authorized under this Power of Attorney, in the case of the Bidding Company/ Lead Member (as applicable) being a public company, or a private company which is a subsidiary of a public company, in terms of the Companies Act, 1956, with a paid-up share capital of more than Indian Rupees Five Crores, should be the Managing Director/ Whole Time Director/ Manager appointed under section 269 of the Companies Act, 1956. In all other cases the person authorized should be a director duly authorized by a board resolution duly passed by the Company.

Also, wherever required, the executant(s) should submit for verification the extract of the chartered documents and documents such as a Board resolution/ power of attorney, in favour of the person executing this power of attorney for delegation of power hereunder on behalf of the executant(s).

ANNEXURE - 16

(FORMAT FOR CYBER SECURITY AGREEMENT)

(To be executed by the successful bidder and shall form part of the Contract Agreement)

This **Non-Disclosure Agreement** ("Agreement") is made effective on this……("Effective Date")

By and Between,

Director ,PLANNING & DESIGN (TS) Directorate, SLDC Complex, Industrial. Area Phase-1, BBMB, Chandigarh, Telephone No. 0172- 2654468, PBX No. 0172-2653735, Email: dirpp@bbmb.nic.in, hereinafter referred as Disclosing Party / BBMB.

And

…….having its registered office at which expression includes successors and assigns, hereinafter referred as Receiving Party / Contractor.

Both collectively referred to as "Parties" and individually as "Party".

WHEREAS

A. BBMB and Contractor are desirous of pursuing a mutually beneficial relationship through the execution of Contract awarded by BBMB to the Contractor vide No…. Dated The Contractor agrees that in the course of their association for executing the said Contract Agreement, there may be sharing of confidential information between them. Through this Agreement, both parties define the obligations with respect to the confidential information.
B. Contractor may receive from the other Party i.e. BBMB certain technical, non-technical, financial, business and other proprietary and confidential information in relation to their respective businesses and contract specific tasks.
C. Due to various Information Security related risks associated with the execution of the contract, BBMB desires to mitigate the perceived risks and seeks to protect its physical and intellectual assets through defined agreements with the Contractor.

NOW THEREFORE, in consideration of the above premises the sufficiency of which is herebyacknowledged, the Contractor agrees as follows:

1. CONFIDENTIAL INFORMATION

"Confidential Information" shall mean any and all information disclosed to, or otherwise acquired or identified or observed by the Receiver including its subsidiaries and affiliates, and each of their respective directors, employees, representatives and agents from the Disclosing Party and its affiliated companies, relating to the business of the Disclosing Party, or received from others that the Disclosing Party is obligated to treat as confidential, and other materials and information of a confidential nature whether communicated in writing, orally, electronically, photographically, or recorded in any other form of media, including, but not limited to, all sales and operating information, contractor's information, employee and other human resource information, existing and potential business and marketing plans and strategies, financial information, cost and pricing information, data media, know-how, designs, specifications, technical configurations, concepts, reports, methods, processes, techniques, operations, devices, , product schematics or drawings, descriptive material, patent and patent applications, trade secrets, trademarks, trade names, specifications, software (source code or object code) and the like, whether or not the foregoing information is patented, tested, reduced to practice, or subject to copyright or any other intellectual property right.

"Confidential Materials" shall mean all tangible materials containing Confidential Information, including without limitation drawings, schematics, written or printed documents, computer disks, tapes, and compact disks (CD), whether machine or user readable.

Notwithstanding the above, all Confidential Information shall be specifically marked as "CONFIDENTIAL" while disclosing the same to the Receiving Party. If the same is orally disclosed then the same to be reduced in writing and marked as "CONFIDENTIAL". Supplier, sub-contractor and other parties engaged by the Disclosing party shall have the same rights and obligations for the Confidential Information.

2. OBLIGATIONS OF RECEIVING PARTY RELATING TO INFORMATION SECURITY

Contractor agrees to conform to the following requirements:

a) All intelligent electronic devices (IEDs), including devices with embedded software, Automation servers Controllers, HMIs and associated network components wherein the data is routable (equipped with Ethernet/optical Ethernet, Serial/Optical Serial) must have capabilities to exceed or meet applicable technical requirements under IEEE-1686:2013 for satisfying IEC/ISO:62443-2-3, IEC/ISO:62443-2-4 and IEC/ISO:62443-3-3 requirements.

b) Contractor agrees to submit required evidences for conformance to IEC/ISO:15408 for identified network-based systems such as routers, firewalls, SIEMs etc.

c) Contractor agrees to provide IT architecture details such as Firmware details, Operating System, databases, middle-ware, application frameworks and related third-party drivers, software component libraries, including usage of virtualization/container technologies, of all devices qualifying under clause (a) above to facilitate vulnerability analysis of the device. BBMB reserves the right to undertake appropriate black-box testing of any system, sub-system to independently ascertain vulnerability of the product/solution.

d) Contractor agrees to enable use of Indian Regional Navigational Satellite Constellation (IRNSS) based Time Synchronization signals through appropriate use of GPS technologies that support PTP (IEEE 1588), if available commercially. In case the same are not available commercially, Contractor may supply the GPS Clock as per their solution requirement.

e) Contractor commits to ensure, its adherence to secure software development life-cycle processes as per IEC/ISO:24748-1 or a similar standard and commits itself for voluntary disclosure of vulnerabilities in the system. Contractor agrees to develop and provide patches, including those of the third-party software components, for the Contractor disclosed vulnerabilities and also for the vulnerabilities discovered/ reported by any third-party organization. The Contractor agrees to ensure supply and installation of patches up to the defect liability period of the system.

f) For all software, operating system, software patches, version upgrades, firmware images etc authorized by the Contractor to be installed during the Life-Cycle of the project, the Contractor agrees to inform BBMB through a digitally signed email, the SHA-256 checksum of all software components.

g) The Contractor agrees to provide a list of all equipment and processes where data encryption is used. All required details for Key Management shall be provided to BBMB. Contractor at its own cost, shall supply requisite digital certificates/keys for installation and configuration of such systems as may be required for securing its interest.

h) Contractor shall provision Notebook PCs as per recommendations of the BBMB, which shall be only authorized device from which access to the network in use, shall be permitted for any preventive maintenance, update and configuration.

i) The Contractor agrees to sign an undertaking, for its commitment to ensure bug and malware-free software/ software patches/ embedded software/ firmware in systems such as PLC Cards/ Logic Cards/ other microprocessor based intelligent systems. The Contractor agrees to declare with each shipment, whether during initial supply stage or subsequent repairs, diagnostics or upgrades, that it shall be solely responsible for any Criminal and/ or Civil Liabilities arising from failures due to such malware/bug. The Contractor further agrees to send a digitally signed statement by email, detailing SHA-256 checksum of all firmware/software components installed during any field/factory activity.

j) The Contractor agrees not to access through use of WiFi/ Bluetooth based networking to any device anywhere in the controlled network. All Bluetooth/ WiFi devices shall be disabled from associated firmware and Operating System in applicable devices of the controlled network.

k) The Contractor agrees to submit details of all devices equipped with Serial Ports (RS232C/RS485/USB etc including with Optical interface), Virtual Serial Ports and Serial over Ethernet. Only BBMB permitted devices shall be attached to serial ports. The Contractor agrees to provide systems to log details of any serial devices connected during the operation of the equipment.

3. PROTECTION OF CONFIDENTIAL INFORMATION

a. Use

The Receiving Party understands and acknowledges that the Confidential Information has been developed or obtained by the Disclosing Party by the investment of significant time, effort and expense, and that Confidential Information is a valuable, special and unique asset of the Disclosing Party. Therefore, the Receiving Party agrees to hold in confidence and not to disclose the Confidential Information, to any person or entity without similar obligations agreed between the Receiving Party and such person or entity. The Receiving Party will use the same standard of care it would use to secure and safeguard its own confidential information of similar importance, but in no event less than reasonable care.

b. No copying.

The Receiving Party will not copy or modify any Confidential Information without the prior written consent of the Disclosing Party, except where such copy or modification is required for the purpose of the execution of the contract. Any permitted reproduction of confidential information must contain all confidential or proprietary legends which appear on the original. The Receiving Party shall immediately notify the Disclosing Party in the event of any loss or unauthorized disclosure or use of the confidential information.

c. Permitted disclosures.

The Receiving Party shall permit access to the Disclosing Party's confidential information solely to the Receiving Party's Representatives and contractors who (i) have a need to know such information; and (ii) have signed the specified confidentiality agreement / similarcontract conditions in favour of Receiving Party

All staff of Receiving Party (on-roll or outsourced) shall be bound by the terms of this Agreement. The Contractor agrees to individually authorize each of the member of staff assigned with the project, binding them individually with the terms ~~of~~ similar to this Agreement during and also post-employment.

d. Additional obligations.

The Receiving Party shall

(i) notify the Disclosing Party promptly of any material unauthorized possession, use or knowledge, or attempt thereof, of the Disclosing Party's confidential information by any person or entity which may become known to the Receiving Party;

(ii) promptly furnish to the Disclosing Party full details of the unauthorized possession, useor knowledge, or attempt thereof;

(iii) use reasonable efforts to assist the Disclosing Party in investigating or preventing the recurrence of any unauthorized possession, use or knowledge, or attempt thereof, of confidential information;

(iv) use reasonable efforts to cooperate with the Disclosing Party in any litigation and / or investigation against third parties deemed necessary by the Disclosing Party toprotect its proprietary rights;

(v) promptly use all reasonable efforts to prevent a recurrence of any unauthorized possession, use or knowledge of confidential information;

(vi) comply with the directives of authorized agencies of Government of India, through appropriate technical configurations and custom modifications to achieve compliance as sought by them from time to time; and

(vii) extend its services as may be required, at least once annually, during the Information Security audits.

e. Unauthorized Disclosure of Information.

If it appears that the Receiving Party has disclosed (or has threatened to disclose) Confidential Information in violation of this Agreement, the Disclosing Party shall be entitled to an injunction to restrain the Receiving Party from disclosing, in whole or in part ,the Confidential Information. The Disclosing Party shall not be prohibited by this provision frompursuing other remedies, subject to suitable notice of the same to Receiving Party and Receiving Party willfully neglecting such notice or duties under the Agreement after such notice including a claim for losses and damages.

f. Exceptions

The following shall not be considered as Confidential Information:

(a) Any information that the Receiving Party can show by documentary evidence was in its possession prior to the disclosure to it hereunder; or

(b) Any information that comes into the possession of the Receiving Party's Representatives, from another party who is under no obligation to the other to maintain confidentiality of such information; or

(c) Any information that becomes generally known other than through the fault of the Receiving Party,

(d) Any particular portion of the Confidential Information which was developed by Receiving Party's Representatives independently of and without reference to any Confidential Information or other information that the Disclosing Party has disclosed in confidence to any third party.

(e) Information available in the public domain whether in tangible or intangible form.

(f) Information that is not proprietary or confidential to the Disclosing Party but an information received from third party not connected to the Project.

(g) Information that has not been marked by the Disclosing Party as "Confidential".

The burden of proving these exceptions to the provisions of this Agreement resideswith the Receiving Party.

4. Remote Support. *Remote Support shall be permitted only as per ISO27001 Policy and Procedures. Further, remote support will only be permitted from within geographical boundaries of India. BBMB reserves the right to only permit the remote support with the presence of BBMB's authorized representative at the remote end.*

5. Compelled Disclosure. In the event that Receiving Party or any of Receiving Party's Representatives is requested or required (by oral questions,

interrogatories, requests for information or documents, subpoena, civil investigative demand or similar incidents) to disclose any of the Confidential Information to the authorities as per mandatory law, it is agreed that Receiving Party or Receiving Party's Representatives, as the case may be, will provide Disclosing Party with prompt notice of such request(s) so that Disclosing Party may seek an appropriate protective order or other appropriate remedy and/or waive compliance with the confidentiality provisions of this Agreement. In the event that such protective order or other remedy is not obtained, or Disclosing Party grants a waiver hereunder, Receiving Party or Receiving Party's Representatives may furnish that portion (and only that portion) of the Confidential Information which Receiving Party is legally compelled to disclose and will exercise reasonable efforts to obtain assurance that confidential treatment will be accorded any Confidential Information so furnished.

6. Information Security Audit.

After commission of the Plant and before operational acceptance of the project, the Contractor shall carry out Cyber Security Audit and VAPT (Vulnerability and Penetration testing) of the complete system from CERT-in empaneled cyber security auditor, and implement the recommendations given by the auditor in consultation with the purchaser. The charges for same shall be deemed to be included in the quoted prices.

BBMB reserves the right to undertake a second party / third party Information Security Audit at any point as may be required, to ascertain the risk/ vulnerability/ threats and the Contractor agrees to take necessary corrective measures in-situ or within a definedtime frame, as the case may be.

7. Term and Termination

This Agreement shall be valid during the contractual period w.e.f. the date of signing of themain contract agreement.

8. Return of Confidential Information.

Upon the written request of the Disclosing Party, the Receiving Party shall return to the Disclosing Party all written materials / digital media containing the Confidential Information to the extent possible by the Receiving Party. The

Receiving Party shall also deliver to the Disclosing Party written statements signed by the Receiving Party certifying that all materials have been returned within thirty (30) days of receipt of the request. Any unreturned Confidential Information shall be required to be maintained with similar confidentiality obligation for 10 years or as per applicable law, whichever is longer.

9. Remedies.

Receiving Party acknowledges that money damages may be incalculable and an insufficient remedy for any breach of this agreement by Receiving Party and that any such breach may cause Disclosing Party irreparable harm. Accordingly, Receiving Party also agrees that, in the event of any breach or threatened breach of this Agreement, Disclosing Party, in addition to any other remedies at law or in equity it may have, shall be entitled, without the requirement of posting a bond or other security, to equitable relief, including injunctive relief and specific performance.

10. Relationship of Parties

Neither party has an obligation under this Agreement to purchase any service or item from the other party, or commercially offer any products using or incorporating the Confidential Information. This Agreement does not create any agency, partnership or joint venture.

11. No Grant of Proprietary Rights

The Receiving Party recognizes and agrees that, except as expressly and specifically set forth in this agreement, nothing herein shall be construed as granting any proprietary right, by license, implication, estoppel or otherwise, to any of the Disclosing Party's, confidential information, trade mark, trade name or to any invention or any patent right that has issued or that may issue based on such confidential information. All information disclosed is provided "as is" without any warranties of any kind.

12. Governing Law

This Agreement shall be governed by and interpreted in accordance with the Indian laws without regard to its conflict of law principles. In particular, the provisions of Information Technology Act 2000, and rules framed thereunder shall be applicable. Further the outline of system level requirements shall be in

conformance to IS:16335-2015 standard. The applicable Information Security Policy shall be the ISO-27001:2013 policy and procedures of BBMB as modified from time to time.

13. Jurisdiction and Venue. In connection with any litigation arising hereunder, Parties hereby

(i) irrevocably and unconditionally submit to the exclusive jurisdiction of courts in Chandigarh and

(ii) Further that dispute if any, shall be dealt with as per the provisions of the dispute settlement clause mentioned in the contract / General Conditions of Contract (GCC).

14. GENERAL PROVISIONS.

(a) This Agreement sets forth the entire understanding of the Parties regarding confidentiality. Any amendments must be in writing and signed by both parties.

(b) This Agreement is intended to facilitate only the exchange of Confidential Information and is not intended to be, and shall not be construed to create a teaming agreement, joint venture association, partnership, or other business organization or agency arrangement and no Party shall have the authority to bind the other without the separate prior written agreement thereof.

(c) This Agreement contains the entire agreement and understanding between the Parties hereto relating to the subject matter hereof and supersedes all other prior agreements and understandings both written and oral, between the Parties with respect to the subject matter hereof. This Agreement may be executed in several counterparts, each of which will be deemed an original, and all of which taken together will constitute one single Agreement between the Parties with the same effect as if all the signatures were upon the same instrument.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement at …….. by their dulyauthorized representatives as of the date first set forth above.

BBMB

Signature: _____ **Signature:** _____

Name: Name :

Title Title :

ANNEXURE-17

[To* be *printed on the bidder's Letter Head and uploaded after signing]

UNDERTAKING REGARDING SITE CONDITON

(In connection with the site visit, the bidder shall submit an Undertaking along with the bid)

Name of Work: "

ANNEXURE – 18

EARNEST MONEY DEPOSIT -BANK GUARANTEE PROFORMA

(To be executed on the appropriate value of Non-Judicial Stamped papers)

This deed of guarantee is made this _____day of _____ between M/s_____(Banker's name) through _____(designation of the person signing the bank guarantee on behalf of the guarantor), a company registered under Companies Act, 1956 (Banking Statute / body corporate constituted under the Banking companies Acquisition and Transfer of Undertakings Act-V of 1970) having its registered office at _____(Address of Registered Office) (herein after called the "Guarantor" which expression shall, unless repugnant to the context of meaning thereof, include its successors and assigns) of the first part and M/s _____through _____(designation of the person signing the Bank Guarantee on behalf of the Tenderer) company registered under Companies Act, 1956, having its registered office at _____(Address of registered office) (herein after called the "Tenderer" which expression shall, unless repugnant to the context or meaning thereof, include its successors and assigns) of the second part and the Bhakra Beas Management Board, through its Chief Engineer/Transmission System a statutory body constituted under Section 79 (1) read with Section 80(6) of the Punjab Re-organization Act, 1966 (hereinafter called the 'Purchaser' which expression shall, unless repugnant to the context or meaning thereof, include its successors and assigns) of the third part.

1. WHEREAS _____(name of Tenderer) has submitted its Tender Offer No.---------- dated---------- (Number and date of tender) (hereinafter called "the Tender") in response to Purchaser's Tender Enquiry No. dated as per BBMB's specification No_____ for **DESIGN, ENGINEERING, PROCUREMENT & SUPPLY, CONSTRUCTION & ERECTION, TESTING, COMMISSIONING, MANDATORY SPARES AND ASSOCIATED TRANSMISSION SYSTEM FOR GRID CONNECTED GROUND MOUNTED SOLAR PHOTOVOLTAIC PROJECTS OF CUMULATIVE CAPACITY MINIMUM 11.5MW (AC) OR HIGHER AS QUOTED BY THE BIDDER AT TWO DIFFERENT LOCATIONS OF BBMB (MINIMUM 10MW (AC) OR HIGHER CAPACITY AT 400KV SUBSTATION, BBMB BHIWANI AND MINIMUM 1.5MW (AC) OR HIGHER CAPACITY AT 220KV SUBSTATION,**

BBMB HISAR) ON LUMPSUM TURNKEY (LSTK) ALONGWITH ANNUAL MAINTENANCE FOR FIVE (5) YEARS EXTENDABLE FOR ANOTHER FIVE (5) YEARS at the rates and on the terms and conditions contained in this tender.

2. And whereas under Bid Information Sheet, the Tenderer is required to furnish a Bank Guarantee in lieu of earnest money deposit for a sum of Rs. _____ (Rupees _____only) and this guarantee shall be kept by the Purchaser till tender for placement of Purchase order / LOA is decided.

3. WHEREAS by these presents the 'Guarantor' is bound unto Purchaser in the sum of _____(amount) for which payment well and truly to be made to the said Purchaser, the Guarantor binds itself, its successors and assigns by these presents.

4. WHEREAS THE CONDITIONS of this obligation are the following:

   i) If the Tenderer withdraws its Tender at any stage during the period of tender validity specified by the Tenderer in the Tender Form or

   ii) If the Tenderer, having been notified of the acceptance of its Tender by the Purchaser during the period of tender validity

   iii) fails or refuses to accept/sign the Purchase Order / LOA when required.

   iv) fails to furnish Security Deposit as per provisions of specification.

   The guarantor hereby guarantees and undertakes to release and pay immediately to the Purchaser upto the above amount unconditionally upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser will note that the amount claimed by it is due to it, owing to the occurrence of one or more of the above named CONDITIONS and specifying the occurred condition or conditions, and the tenderer shall not have any right or cause to interfere.

5. WHEREAS this Guarantee will remain in full force and effect for 12 months from date of its issue in the first instance. This guarantee shall be revalidated subsequently for a further period, if required by the Purchaser with the prior consent of the Tenderer. The Guarantor also agrees and undertakes not to revoke this guarantee within its validity period as aforesaid.

6. WHEREAS the Guarantor hereby further agrees that the Purchaser shall have the fullest liberty without effecting in any manner the obligation of the Guarantor

hereunder with or without any consent of the Guarantor to vary any of the terms of said Tender or to extend from time to time or to postpone for any time or from time to time any of the powers exercisable by the Purchaser against the Tenderer and either to forbear or enforce, any of the terms or conditions relating to the said Tender and the Guarantor shall not be relieved from his liability by reasons of any variation or any extension being granted to the Tenderer or for any forbearance, act, or omission on the part of the Purchaser or any indulgence by the Purchaser to the Tenderer or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving the Guarantor. Nor shall it be necessary for the Purchaser to sue the Tenderer before suing the Guarantor for the amount/damages due under this deed of guarantee. And it is agreed and declared that this guarantee will be enforceable even if the Tenderer's company goes into liquidation or there is any change in the constitution of said company or management of the said company and shall ensure to the benefit of its successors and assigns and shall be binding on the successors and assigns of the Bank.

7. WHEREAS the Guarantor hereby further declares that this guarantee has been executed by its lawfully constituted attorney legally competent to sign and execute and has been stamped as required for such guarantees under the relevant Act of the State in which it has been executed and signed and this Guarantee shall not be effected by any change in constitution of the Guarantor or the Tenderer.

8. WHEREAS the guarantor hereby further agrees that any claim or dispute arising under this deed shall fall within the exclusive jurisdiction of courts at Chandigarh. Notwithstanding anything herein before contained, Guarantor's liability under this guarantee is restricted to Rs._____/- (Rupees_____only). This guarantee shall remain in force until_____. Unless a claim in writing is presented to the Guarantor within six months from that date and if unpaid a suit or action to enforce such claim is filed against the Guarantor within said period of six months, all the rights of the Purchaser under the said guarantee shall be forfeited and the Guarantor shall be released and discharged from all liabilities thereunder.

In witness whereof the parties hereto have put their respective hands on the day and the year first above mentioned.

Witness: - **For and on behalf of the Guarantor**

1. Signature, Name, Designation & Full address. Signature

_____

2. Signature, Name, Designation & Full address. Name & Designation

_____

Full Address with Rubber Seal

Witness: - **For and on behalf of the Contractor**

1. Signature, Name, Designation & Full address. Signature _____

2. Signature, Name, Designation & Full address. Name & Designation _____

Full Address with Rubber Seal

Witness: - **For and on behalf of the Purchaser**

1. Signature, Name, Designation & Full address. Signature

_____

2. Signature, Name, Designation & Full address. Name & Designation _____

Full Address with Rubber Seal

ANNEXURE – 19

INTEGRITY PACT AGREEMENT

Bhakra Beas Management Board (BBMB hereinafter referred to as "The Principal"

And

_____hereinafter referred to as "The Bidder/Contractor"

Preamble

The Principal intends to award, under laid own organizational procedures, contract/s for _____. The Principal values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness/transparency in its relations with its Bidder(s) and/or Contractor(s).

In order to achieve these goals, the Principal has appointed Independent External Monitors (IEM), Lt. General Raman Dhawan and Sh. Pramod Deepak Sudhakar, IAS(Retd.), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned below:-

Section -1:- Commitments of the Principal

1. The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-
   a) No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

   b) The Principal will during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/additional information through which the Bidder(s) could obtain and advantage in relation to the process the contract execution.

   c) The Principal will exclude from the process all known prejudiced persons.

2. If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the Indian Penal Code 1860/Prevention of Corruption Act,1988 (IPC/PC Act) as amended from time to time or if there be a substantive suspicion in this regard, the Principal will inform the Chief Vigilance Officer and in addition can initiate disciplinary actions.

Section- 2:- Commitments of the Bidders(s)/Contractor(s)

1. The Bidder(s)/contractor(s) commit himself/itself to take all measure necessary to prevent corruption. He/it commits himself/itself to observe the following principles during his/its participation in the tender process and during the contract execution.

a) The Bidder(s)/contractor(s) will not directly or through any other persons or firm, offer promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage or during execution of the contract.

b) The bidder(s)/contractor(s) will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contacts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce centralization in the bidding process.

c) The bidder(s)/contractor(s) will not commit any offence under the relevant IPC/PC Act: further the bidder(s)/contractor(s) will not use improperly, for purpose of competition or personal gain, or pass on to others, any information or document provided by the Principal as part to the business relating, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

d) The Bidder(s)/contractor(s) of foreign origin shall disclose the name and address of its Agents/representative in India, if any. Similarly, the bidder(s)/contractor(s) of Indian Nationality shall furnish the name and address of their foreign principals, if any. Further details as mentioned in the "Guidelines

on Indian Agents of Foreign Suppliers" shall be disclosed by the Bidder(s)/contractor(s). Further, as mentioned in the Guidelines all the payments made to the Indian agent/representative have to be in Indian Rupees only.

Copy of the "Guidelines on Indian Agents of Foreign Suppliers" Annexure-A)

e) The Bidder(s)/contractor(s) will, when presenting his/its bid, disclose any and all payments he/it has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2. The Bidder(s)/Contractor(s) will not instigate third persons to commit offence outlined above or be an accessory to such offences.

Section-3:- Disqualification from tender process and exclusion from future contracts.

If the Bidder(s)/contractor(s), before award or during execution has committed transgression through a violation of Section 2, above or in any other from such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/Contractor(s) from the tender process or take action as per procedure mentioned in the **"Guidelines on Banning of Business dealings (Annexure-B)".**

Section-4:- Compensation for Damages

2. If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/Bid Security.
3. If Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to Section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages of the Contract value or the amount equivalent to Performance Bank Guarantee.

Section-5:- Previous Transgression

1. The Bidder declares that no previous transgressions occurred in the last three years with any other company in any country conforming to the anti-corruption approach or with any other public sector enterprise in India that could justify his/its exclusion from the tender process.
2. If the bidder makes incorrect statement on this subject, he it can be disqualified from the tender process for action can be taken as per the procedure mentioned in "Guidelines on Banning of business dealings."

Section 6: Equal treatment of all bidders/Contractors/Subcontractors

1. The Bidder(s)/Contractor(s) undertake(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.
2. The Principal will enter into agreements with identical conditions as this one with all bidders, contractors and subcontractors.
3. The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section-7:-Criminal charges against violation by Bidder(s)/Contractor(s)/ Subcontractor(s)

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitute corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the same to the Chief Vigilance Officer.

Section-8: - Independent External Monitor/Monitors

1. The Principal has appointed competent and credible Independent External Monitor(s) for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
2. The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He submits reports to Chairman BBMB.

3. The Bidder(s)/Contractor(s) accepts that the Monitor has the right to access without restriction to all project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/Contractor(s)/Subcontractor(s) with confidentiality.
4. The Principal will provide to the Monitor sufficient information about all meeting among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
5. As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal in writing and request the Management to discontinue or take corrective action, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.
6. The Monitor will submit a written report to the Chairman, BBMB within 8 to 10 weeks from the date of reference or intimation to him by the Principal and should be occasion arise; submit proposals for correcting problematic situations.
7. If the Monitor has reported to the Chairman BBMB a substantiated suspicion of an offence under relevant IPC/PC Act and the Chairman BBMB has not within the reasonable time taken visible action to proceed against such offence or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner.
8. The word ‘Monitor’ would include both singular and plural.

Section-9: - Pact Duration

This pact begins when both parties have legally singed it. It expires for the Contractor 10 months after the last payment under the contract, and for all other Bidders six months after the contract has been awarded.

If any claim is made/lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is

discharged/determined by Chairman of BBMB.

Section-10:- Other provisions

- This agreement is subject to Indian Laws, Place of performance and jurisdiction is the Registered Office of the Principal, i.e. Chandigarh.
- Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

_____	_____
(For & on behalf of Principal)	(For & behalf of Bidder/Contractor)
(Office seal)	(Office seal)
Place: ----------	Place: ----------
Date: ----------	Date: ----------

Witness:-

For and on behalf of the Purchaser	**For and on behalf of the Contractor**
1. Signature_____	1. Signature _____
Name & Designation _____	Name & Designation _____
Full Address with Rubber Seal	Full Address with Rubber Seal
2. Signature_____	2. Signature _____
Name & Designation _____	Name & Designation _____
Full Address with Rubber Seal	Full Address with Rubber Seal

Annexure-A (For Integrity Pact -Annexure-IXX)

GUIDELINES FOR INDIAN AGENTS OF FOREIGN SUPPLIERS

1.0 There shall be compulsory registration of agents for all Global (Open) Tender and Limited Tender. An agent who is not registered with BBMB Plants/units shall apply for registration in the prescribed Application form.

1.1 Registered agents will file an authenticated Photostat copy duly attested by a Notary Public/Original certificate of the principal confirming the agency agreement and giving the status being enjoyed by the agent and the commission/remuneration/salary/retainer ship being paid by the principal to the agent before the placement of order by BBMB Plants/Units.

1.2 Wherever the Indian representatives have communicated on behalf of their principals and the foreign parties have stated that they are not paying any commission to the Indian agents, and the Indian representative is working on the basis of salary or as retainer, a written declaration to this effect should be submitted by the party (i.e. Principal) before finalizing the order.

2.0 **DISCLOSURE OF PARTICULARS OF AGENTS/REPRESENTATIVES IN INDIA, IF ANY.**

2.1 Tenderers of Foreign nationality shall furnish the following details in their offer;

2.1.1 The name and address of the agents/representatives in India, if any and the extent of authorization and authority given to commit the Principals. In case the agent/representative be a foreign company, it shall be confirmed whether it is real substantial Company and details of the same shall be furnished.

2.1.2 The amount of commission/remuneration included in the quoted price(s) for such agent/representative in India.

2.1.3 Confirmation of the Tenderer that that the commission/remuneration if any, payable to the agents/representatives in India, may be paid by BBMB in the

Indian Rupees only.

2.2 Tenderers of Indian nationality shall furnish the following details in their offer;

2.2.1 The name and address of the foreign principals indicating their nationality as well as their status, i.e. whether manufacturer or agents of manufacturer holding the Letter of Authority of the Principal specifically authorizing the agent to make an offer in India in response to tender either directly or through the agents/representatives.

2.2.2 The amount of commission/remuneration included in the price (s) quoted by the Tenderer for himself.

2.2.3 Confirmation of the foreign principals of the Tenderer that the commission/ remuneration, if any, reserved for the Tenderer in the quoted price(s) , may be paid by BBMB in India in equivalent Indian Rupees on satisfactory completion of the Project or supplies of Stores and Spares in case of operation items.

2.3 In either case, in the event of contract materializing, the terms of payment will provide for payment of the commission/remuneration, if any payable to the agents/representatives in India in Indian Rupees on expiry of 90 days after the discharge of the obligations under the contract.

2.4 Failure to furnish correct and detailed information as called for in paragraph-2.0 above will render the concerned tender liable to rejection or in the agent of a contract materializing the same liable to termination by BBMB. Besides this there would a penalty of banning business dealings with BBMB or damage or payment of a named sum.

Annexure-B (For Integrity Pact -Annexure-IXX)

GUIDELINES ON BANNING OF BUSINESS DEALINGS

1. Introduction

1.1 BBMB is a large organization constituted under the Punjab Re-organizations Act.1966 to manage the Bhakra and Beas Projects dealing with partner states to supply water and Electricity BBMB has also to safeguard its commercial interests. BBMB deals with agencies, who have a very high degree of integrity, commitments and sincerity towards the work undertaken. It is not in the interest of BBMB to deal with Agencies who commit deception, fraud or other misconduct in the execution of contracts awarded /orders issued to them, In order to ensure compliance with the constitutional mandate, it is incumbent on BBMB to observe principles of natural justice before banning the business dealing with any Agency.

1.2 Since banning of business dealings involves civil consequences for an agency concerned, it is incumbent that adequate opportunity of hearing is provided and the explanation, if tendered, is considered before passing any order in this regard keeping in view the facts and circumstances of the case.

2. Scope

2.1 The General BBMB Conditions of Contract (GCC) of BBMB generally provide that BBMB reserves its rights to remove from list of approved supplies/contractors or to ban business dealings if any agency has been found to have committed misconduct and also to suspend business dealings pending investigations. If such provision does not exist in any GCC, the same may be incorporated.

2.2 Similarly, in case of sale of material there is a clause to deal with the agencies/customers /buyers, who indulge in lifting of material in unauthorized manner. If such a stipulation does not exist in any Sale Order, the same may be incorporated.

2.3 However, absence of such a clause does not in any way restrict the right of Company to take action/decision under these guidelines in appropriate cases.

2.4 The procedure of

i) Removal of Agency from the List of approved supplies/contractors;
ii) Suspension and
iii) Banning of Business Dealing with Agencies, has been laid down in these guidelines.

2.5 These guidelines apply to all the Plants/Units and subsidiaries of BBMB.

2.6 It is clarified that these guidelines do not deal with the decision of the Management not to entertain any particular Agency due to its poor/inadequate performance or for any other reason.

2.7 The banning shall be with prospective effect, i.e. future business dealings.

3. Definitions

In these Guidelines, unless the context otherwise requires:

i) 'Party/contractor/Supplier/Purchaser/Customer' shall mean and include a public Limited Company or private Limited Company, a firm whether registered or not individual, a cooperative society or an association or a group of persons engaged in any commerce, trade, industry, etc. 'party / contractor / supplier / purchaser / customer' in context of these guidelines is indicated as 'Agency'.

ii) 'Inter-connected Agency' shall mean two or more companies having any of the following features.

a) If one is a subsidiary or the other.
b) If the Directors, Partners, Managers or representative are common.
c) If management is common;
d) If one owns or controls the other in any manner;

iii) 'Competent Authority and Appellate Authority' shall mean the following;

a) For Company BBMB Wide Banning. the Director (Technical shall be the 'competent Authority' for the purpose of these guidelines. Chairman, BBMB shall be the 'Appellate Authority in respect of such cases except banning of business dealing with foreign Suppliers of imported coal/coke.
b) For banning of business dealing with Foreign Suppliers of imported coal/coke, BBMB Directors' Committee (SDC) shall be the 'competent Authority'. The Appeal against the order passed by SDC, shall lie with Chairman, as First Appellate Authority.
c) In case the foreign supplier is not satisfied by the decision of the first Appellate Authority, it may approach BBMB Board as Second Appellate Authority.
d) For plants/Units only :-

Any officer not below the rank of General Manage/Addl. Director

appointed or nominated by the Chief Executive of concerned Plant/unit shall be the 'competent Authority' for the purpose of these guidelines. The Chief Executive of the concerned plants/units shall be the 'Appellate Authority' in all such cases.

e) For Corporate office only

For procurement of items/award of contracts, to meet the requirement of Corporate office only, Head of CMMG shall be the "competent Authority" and Director (Technical) shall be the "Appellate Authority.

f) Chairman BBMB shall have overall power to take suo-moto action on any information available or received by him and pass such order(s) as he may think appropriated, including modifying the order(s) passed by any authority under these guidelines.

iv) Investigation Department' shall mean any Department or Unit investigating into the conduct of the Agency and shall include the Vigilance Department, Central Bureau Investigation, the State Police or any other department set up by the Central or State Government having powers to investigate.

v) List of approved Agencies – Parties/Contractors/Suppliers/Purchasers/ Customers shall mean and include list of approved/registered Agencies-parties/ Contractors/ Suppliers/Purchasers/customers, etc.

4. Initiation of Banning/Suspension

Action for banning/suspension business dealings with any Agency should be initiated by the department having business dealings with them after noticing the irregularities or misconduct on their part. Besides the concerned department, Vigilance Department or each Plant/Unit/Corporate Vigilance may also be competent to initiate such action.

5. Suspension of Business Dealing

5.1 If the conduct of any Agency dealing with BBMB is under investigation by any department (except Foreign Suppliers of imported coal/coke), the Competent Authority may consider whether the allegations under investigation are of a

serious nature and whether pending investigation, it would be advisable to continue business dealing with the Agency. If the Competent Authority, after consideration of the matter including the recommendation of the Investigating Department, if any, decides that it would not be in the interest to continue business dealings pending investigation, it may suspend business dealings with the Agency. The order to this effect may indicate a brief of the charges under investigation. If it is decided that inter connected Agencies would also come within the ambit of the order of suspension, the same should be specifically stated in the order. The order of suspension would operate for a period not more than six months and may be communicated to the Agency as also to the Investigating Department. The Investigating Department may ensure that their investigation is completed and whole process of final order is over within such period.

5.2 The order of suspension shall be communicated to all Department Heads within the Plants/Units. During the period of suspension, no business dealing may be held with the Agency.

5.3 As far as possible, the existing contract(s) with the Agency may continue unless the Competent Authority, having regard to the circumstances of the case, decides otherwise.

5.4 If the gravity of the misconduct under investigation is very serious and it would not be in the interest of BBMB as a whole, to deal with such an agency pending investigation, the Competent Authority may send his recommendation to Chief Vigilance Officer (CVO), BBMB, Corporate office considers that depending upon the gravity of the misconduct, it would not be desirable for all the plants/Units and subsidiaries of BBMB to have any dealings with Agency concerned, an order suspending business dealings may be issued to all the Plants/Units by the Competent Authority of the Corporate Office, copy of which may be endorsed to the Agency concerned. Such an order would operate for a period of six months from the date of issue.

5.5 For suspension of business of dealings with Foreign Suppliers of imported coal/coke, following shall be the procedure:-

i) Suspension of the foreign suppliers shall apply throughout the Company including Subsidiaries.

ii) Based on the complaint forwarded by ED (CIG) or received directly by corporate Vigilance, if gravity of the misconduct under investigation is found serious and it is felt that it would not be in the interest of BBMB to continue to deal with such agency, pending investigation, corporate Vigilance may send such recommendation on the matter to Executive Director, coal Import Group (ED,CIG) to place it before a committee consisting of the following:

1. ED,(F&A) Head of Corporate Finance
2. ED, CIG/ Head of CIG- Convener of the Committee
3. ED, CMMG/ Head of CMMG, Corporate Office
4. ED,(Law) Head of Corporate Law

The Committee shall expeditiously examine the report, give its comments/recommendation within twenty one days of receipt of the reference by ED, CIG

iii) The comments/recommendations of the committee shall then be placed by ED, CIG before BBMB Directors Committee (SDC) constituted for import of Coal. If SDC opines that it is a fit case for suspension, SDC may pass necessary orders which shall be communicated to the foreign supplier by ED,CIG

5.6 If the Agency concerned asks for detailed reasons of suspension, the Agency may be informed that its conduct is under investigation. It is not necessary to enter into correspondence or argument with the Agency at this stage.

5.7 It is not necessary to give any show-cause notice or personal hearing to the Agency before issuing the order of suspension. However, if investigations are not complete in six months' time, the Competent Authority may extend the period of suspension by another three months, during which period the investigations must be completed.

6. Ground on which Banning of Business Dealings can be initiated

If the security consideration, including questions of loyalty of the Agency to the State, so warrants;

6.1 If the Director/Owner of the Agency, proprietor or partner of the firm, is convicted by a Court of Law for offences involving moral turpitude in relation to its business dealings with the Government or any other public sector enterprises or BBMB during the last five years;

6.2 If there is strong justification for believing that the Directors, Proprietors, Partners, owner of the Agency have been guilty of malpractices such as bribery, corruption, fraud, substitution of tenders, interpolations, etc.

6.3 If the Agency continuously refuses to return/refund the dues of BBMB without showing adequate reason and this is not due to any reasonable dispute which would attract proceedings in arbitration or Court of Law;

6.4 If the Agency employs a public servant dismissed/removed or employs a person convicted for an offence involving corruption or abetment of such offence;

6.5 If business dealings with the Agency have been banned by the Govt. or any other public sector enterprise;

6.6 If the Agency has resorted to Corrupt, fraudulent practices including misrepresentation of facts;

6.7 If the Agency uses intimation/threatening or brings undue outside pressure on the Company (BBMB) its official in acceptance/performances of the job under the contract.

6.8 If the Agency indulges in repeated and/or deliberate use of delay tactics in complying with contractual stipulations;

6.9 Willful indulgence by the Agency in supplying sub-standard material irrespective of whether pre-despatch inspection was carried out by Company(BBMB) or not;

6.10 Based on the findings of the investigation report of CBI/Police against the Agency for malafide/unlawful acts or improper conduct on his part in matters relating to the Company (BBMB) or even otherwise;

6.11 Established litigant nature of the Agency to derive undue benefit;

6.12 Continued poor performance of the Agency in several contracts;

6.13 If the Agency misuses the premises or facilities of the Company (BBMB), forcefully occupies tampers or damages the Company's properties including land, water resources, forests/trees, etc.

(Note: The examples given above are only illustrative and not exhaustive. The competent Authority may decide to ban business dealing for any good and sufficient reason).

7. Banning of Business Dealings

7.1 Normally, a decision to ban business dealings with any Agency should apply throughout the Company including Subsidiaries. However, the Competent Authority of the plant/Unit except Corporate Office can impose such ban unit-wise only if in the particular case banning of business dealings by respective Plant/Unit will serve the purpose and achieve its objective and banning throughout the Company is not required in view of the local conditions and impact of the misconduct/default to beyond the plant/Unit. Any ban imposed by Corporate office shall be applicable across all Plants/Units of the Company including Subsidiaries.

7.2 For company-wise banning, the proposal should be sent by ACVO of the Plant/Unit to the CVO through the Chief Executive of the Plant/Unit setting out the facts of the case and the justification of the action proposed alongwith all the relevant papers and documents except for banning of business dealings with Foreign Suppliers of imported coal/coke.

The Corporate Vigilance shall process the proposal of the Plant/Unit for a prima-facie view in the matter by the Competent Authority nominated for Company-

wide banning.

The CVO shall get feedback about that agency from all other Plants/Units. Based on this feedback, a prima-facie decision for banning/ or otherwise shall be taken by the Competent Authority.

If the prime-facie decision for Company-wide banning has been taken, the Corporate Vigilance shall issue a show cause notice to the agency conveying why it should not be banned throughout BBMB.

After considering the reply of the Agency and other circumstances and facts of the case, a final decision for Company-wide banning shall be taken by the Competent Authority.

7.3 There will be a Standing Committee in each Plant/Unit to be appointed by Chief Executive for processing the cases of "Banning of Business Dealings" except for banning of business dealings with foreign suppliers of coal/coke. However, for procurement of items/award of contracts, to meet the requirement of Corporate Office only, the committee shall be consisting of General Manager/Dy. General Manager each from Operations, Finance, Law & CMMG. Member from CMMG shall be the convener of the committee. The functions of the committee shall, inter-alia include:

i) To study the report of the Investigating Agency and decide if a prime-facie case for Company-wide/Local unit wise banning exists, if not, send back the case to the Competent Authority.

ii) To recommend for issue of show-cause notice to the Agency by the concerned department.

iii) To examine the reply to show-cause notice and call the Agency for personal hearing, if required.

iv) To submit final recommendation to the competent Authority for banking or otherwise.

7.4 If the Competent Authority is prime-facie of view that action for banning business dealings with the Agency is called for, a show-cause notice may be issued to the Agency as per paragraph 9.1 and an enquiry held accordingly.

7.5 Procedure for Banning of Business Dealings with Foreign Suppliers of imported coal/coke:

i) Banning of the agencies shall apply throughout the Company including Subsidiaries.

ii) Based on the complaint forwarded by ED CIG or received directly by Corporate Vigilance, an investigation shall be carried out by Corporate Vigilance. After investigation depending upon the gravity of the misconduct, Corporate Vigilance may send their report to Executive Director, Coal Import Group to be placed before a Committee consisting of the following:

1. ED (F&A)/Head of Corporate Finance.
2. ED, CIG/Head of CIG –Convener of the Committee
3. ED, CMMC/Head of CMMG, Corporate Office.
4. ED (Law)/Head of Corporate Law.

The Committee shall examine the report and give its comments/recommendations within 21 days of receipt of the reference by ED, CIG.

iii) The comments/recommendations of the Committee shall be placed by ED, CIG before BBMB Directors' Committee (SDC) constituted for import of Coal. If SDC opines that it is a fit case for initiating banning action, it will direct ED (CIG) to issue show-cause notice to the agency for replaying within a reasonable period.

iv) On receipt of the reply or on expiry of the stipulated period, the case shall be submitted by ED(CIG) to SDC for consideration and decision.

v) The decision of the SDC shall be communicated to the agency by ED(CIG).

8. Removal from List of Approved Agencies – Suppliers/Contractors, etc.

8.1 If the Competent Authority decides that the charge against the Agency is of a minor nature, it may issue a show-cause notice as to why the name of the Agency should not be removed from the list of approved Agencies –

Suppliers/Contractors, etc.

8.2 The effect of such an order would be that the Agency would not be disqualified from competing in Open Tender Enquiries but LTE may not be given to the Agency concerned.

8.3 Past performance of the Agency may be taken into account while processing for approval of the Competent Authority for awarding the contract.

9. Show-cause Notice

9.1 In case where the Competent Authority decides that action against an Agency is called for, a show-cause notice has to be issued to the Agency. Statement containing the imputation of misconduct or misbehavior may be appended to the show-cause notice and the Agency should be asked to submit within 15 days a written statement in its defense.

9.2 If the Agency requests for inspection of any relevant document in possession of BBMB, necessary facility for inspection of documents may be provided.

9.3 The competent Authority may consider and pass an appropriate speaking order:

a) For exonerating the Agency if the charges are not established;

b) For removing the Agency from the list of approved./Suppliers/contractors, etc.

c) For banning the business dealing with the Agency.

9.4 If it decides to ban business dealings, the period for which the ban would be operative may be mentioned. The order may also mention that the ban would extend to the interconnected Agencies of the Agency.

10. Appeal against the Decision of the Competent Authority

10.1 The Agency may file an appeal against the order of the Competent Authority banning business dealing, etc. The appeal shall lie to Appellate Authority. Such an appeal shall be preferred within one month from the date of receipt of the order banning business dealing, etc.

10.2 Appellate Authority would consider the appeal and pass appropriate order which shall be communicated to the Agency as well as the Competent Authority.

11. Review of the Decision by the Competent Authority

Any petition/application filed by the Agency concerning the review of the banning order passed originally by Chief Executive/Competent Authority under the existing guidelines either before or after filing of appeal before the Appellate Authority or after disposal of appeal by the Appellate Authority, the review petition can be decided by the Chief Executive/Competent Authority upon disclosure of new facts/circumstances or subsequent development necessitating such review. The competent authority may refer the same petition to the Standing Committee for examination and recommendations.

12. Circulation of the names of Agencies with whom Business Dealings have been banned

12.1 Depending upon the gravity of misconduct established, the Competent Authority of the Corporate Office may circulate the names of Agency with whom business dealings have been banned, to the Government Departments, other Public Sector Enterprises, etc for such action as they deem appropriate.

12.2 If Government Departments or a Public Sector Enterprise request for more information about the Agency with whom business dealings have been banned, a copy of the report of Inquiring Authority together with a copy of the order of the Competent Authority/Appellate Authority may be supplied.

12.3 If business dealings with any Agency have been banned by the Central or State Government or any other Public Sector Enterprise, BBMB may, without any further enquiry or investigation, issue an order banning business dealing with the Agency and its inter-connected Agencies.

12.4 Based on the above, Plants/Units may formulate their own procedure for implementation of the Guidelines.

Annexure – 20

SELF-CERTIFICATION UNDERTAKING BY THE BIDDER

1. It is certified that all the Bidder Qualifications Criteria Documents and Credentials submitted / uploaded as a part of this tender are genuine and authentic documents.
2. It is certified that none of the documents are false/forged or fabricated. All the documents submitted have been made having full knowledge of (i) the provisions of the Indian laws in respect of offences including but not limited to those pertaining to criminal breach of trust, cheating and fraud and (ii) provisions of bidding conditions which entitle BBMB to initiate appropriate action in the event of such declaration turning out to be a misrepresentation or false representation.
3. It is certified that additional documents, if any, required to be submitted by us (bidding agency) shall be submitted under my knowledge and those documents shall also be true, authentic, genuine, exact copy of its original and shall not be false/forged or fabricated.
4. It is certified that I/We understand that BBMB reserves the right not to consider our offer on account of noncompliance regarding submission of Bidder Qualifications Criteria /techno-commercial related documents etc.
5. It is certified that I/We are not under insolvency, liquidation, court receivership or similar proceedings. I/We will immediately inform to Purchaser (BBMB) in case of any change in the situation any time hereinafter. BBMB have full right to reject our bid If it is found that we are under insolvency, liquidation, court receivership or similar proceedings.
6. I / We certified that I / we have not been banned / de-listed / black listed / debarred from business by BBMB /BBMB Partner States (Punjab, Haryana, Himachal Pradesh, Rajasthan and Chandigarh) / Ministry of New & Renewable Energy (MNRE)/Government Department/PSU's. I/We will immediately inform to Purchaser (BBMB) in case of any change in the situation any time hereinafter.

Authorized Signatory holding Power of Attorney

Name & Designation

Annexure - 21

TERMS AND CONDITIONS FOR E-REVERSE AUCTION

E-Reverse Auctions will be carried out in BBMB under the below mentioned framework of rules.

a. Only vendors who are technically qualified and submit the prescribed undertaking (Annexure-21A) to the BBMB can participate in e- Reverse Auction relevant to the EPC for which NIT is floated. Participation in e-reverse auction is mandatory for all eligible bidders. The vendors participating in e-Reverse Auction shall submit the undertaking duly signed by their authorized signatory who signs the offer documents in response to the NIT for acceptance of Rules for e-Reverse Auction. Any vendor not willing to submit such an undertaking shall be disqualified for further participation in respect of the Tender in question.

b. BBMB shall conduct the e-Reverse Auction as per the Standard English e-Reverse auction, i.e, no two bids can have identical price from two different vendors. In other words, there shall never be a "'Tie" in bids.

c. Each bidder will be provided unique log in ID and password by the service provider to participate in e- Reverse Auction. Each bidder shall have the option to change the password after receipt of initial password.

d. The date and time of commencement of e-Reverse Auction and duration of E-Reverse Auction time shall be communicated at last 4 working days prior to such auction date. Any force majeure or other condition necessitating post ponement of auction shall entitle the BBMB for postponement of auction even after communication, but, the BBMB shall be obliged to communicate to all participating vendors the postponement prior to commencement of such e-Reverse Auction. In such cases also, a notice of at least 4 working days shall be given.

e. The statement of evaluated comparative prices (including all loadings) i.e pre-auction TCO shall be shared with all the eligible bidders well before the start of e-Reverse Auction , so as to make the procedure transparent. The concept of TCO is given in Annexure-21B.

f. Online price bids given by the bidders, will be opened on the due date & time and the lowest total cost of ownership lowered by one decrement will be fixed as starting price and bid decrement will be 0.5% of bid start price rounded of the next Rs. 100. The vendors shall be able to bid only at such specified decrement value and not at any other fractions. For the sake of convenience of vendors, the web portal shall display the decremented value of bid. It is not, however, obligatory on the part of vendors to bid at the next immediate lower level only (i.e. bids can be even at 2 or more level lower than the immediate lower level).

g. e-Reverse Auction process will be conducted for a period of one hour where the bidder will be allowed to reduce the price. If the lowest bid is received within ten minutes prior to schedule closing time of e- reverse auction, the service provider's system shall automatically extend the period of e- Reverse Auction for further ten minutes from the time of receipt of such lowest bid. The system shall automatically keep on extending the e- Reverse Auction timing till the lowest bid received remain unchanged for ten minutes after scheduled closure time. At closing of e-auction within scheduled time or extended time as above, service provider's system shall automatically get locked so that participants cannot enter their bids thereafter.

h. All bidders will be able to view during the auction time the current lowest price in portal. Bidder shall be able to view not only the lowest bid but also the last bid made by him at any point of time during the auction time.

i. Names of bidder/ vendors shall be anonymously masked in the e-Reverse Auction process and vendors will be given suitable dummy names/codes. After completion of e- Reverse Auction, the service provider shall submit a report to the BBMB with all details of bid and the original names of the bidders as also the L1 bidder with his/ their original names.

j. Service provider is responsible for conduct of adequate training to all technically qualified bidders representing the e-Reverse Auction and bidding process. All the bids made from the log-in ID given to bidder shall ipso-facto be considered bid made by the vendor/ bidder to whom log-in ID and password were assigned by the service provider. Any bid once made through registered log- in ID/ password by the vendor/bidder cannot be cancelled. The bidder, in other words, is bound to sell the ''Offering'' as per the NIT at the bid price.

Every successive bid by the bidder/vendor being decremented bidding shall replace the earlier bid automatically and the final bid as per the time and log-in ID shall prevail over the earlier bids.

k. After completion of online event of e-Reverse Auction, the successful bidder shall submit breakup of their final quoted price (post auction TCO price) depicting all the price components through e-mail, so as to enable Purchaser to award the Letter of Award. Else, the final quoted price shall be reworked among various components in the TCO on pro-rata basis except fixed loading(s), if any, by the purchaser.

l. Cancellation of e- Reverse Auction Process: BBMB shall however, be entitled to cancel the e-Reverse Auction process, if in its view e-Reverse Auction process cannot be conducted in a fair manner and/or in the interest of the BBMB.

m. Errors and Omissions: On any issue or area of material concern respecting e-Reverse Auction not specifically dealt with in these Rules the decision of the BBMB shall be final and binding on all concerned.

n. No vendor shall involve himself/ itself or any of his/ its representatives in any price manipulation directly or indirectly with other bidders. If any such practice comes to the notice, BBMB shall disqualify the vendor/bidder concerned from the e-Reverse auction process.

o. Bidder shall not disclose details of his bids or any other details concerning e-Reverse Auction process of the BBMB to any other third party without specific permission in writing from the BBMB.

p. Neither BBMB nor service provider can be held responsible for consequential damages such as no power supply, system problem, inability to use the system, loss of electronic information, power interruption, UPS failure etc. (BBMB shall, however, entertain any such issues of interruptions, problems with open mind and fair degree of transparency in the process before deciding to stop or extend the auction).

Annexure-21A

UNDERTAKING

(To be submitted by all the vendors participating in e- Reverse Auction)

To,

_____

_____

DECLARATION

1. We _____(name of the company) hereby confirm having submitted our bid for participating in BBMBs NIT_____dated _____for _____(Name of work).
2. We also confirm having read the terms of NIT as well as the Rules relating to the e-Reverse Auction for this NIT process.
3. We hereby undertake and agree to abide by all the terms and conditions stipulated by BBMB in the NIT document including all annexures and the Rules for e-Reverse Auction.
4. We shall participate in e-reverse auction conducted by _____ (auction company). We shall also abide by the procedures prescribed for online auction by the auction company.
5. We hereby confirm that we will honour the Bids placed by us during the auction process, failing which our EMD shall be forfeited and we also understand that BBMB may debar us from participating in future tenders.

Signature with company seal

Name-

Company/ Organization- Designation within Company/ Organization-Address of Company/Organization-

Date:

Annexure-21B

Total Cost of Ownership (TCO) Price: TCO refers to the aggregate amounts payable by the BBMB for transfer of ownership. TCO shall include but not be limited to the following:-

1. Cost of the equipment/product or services.
2. License fee (as defined in NIT), if any.
3. All existing taxes i.e. GST etc.
4. Installation and commissioning charges, if any
5. The prices should include the comprehensive on-site warranty maintenance of the equipment covering all components, services, and visits to the concerned offices as specified in the NIT.
6. Annual Maintenance Charges for the period as specified in the NIT, if any.
7. Transportation and forwarding charges to respective sites.
8. Training costs for the product/service/equipment if and as defined in NIT.
9. Insurance to cover the equipment for and from transit period till installation.
10. All other loadings, if any.

The TCO shall be arrived at after deducting 'buy back' costs involved if any.

ANNEXURE - 22

SECURITY DEPOSIT - BANK GUARANTEE PROFORMA

(To be executed on the appropriate value of Non-Judicial Stamped papers by the successful bidder)

1. This deed of guarantee is made this _____day of _____ between M/s_____(Banker's name) through _____(designation of the person signing the bank guarantee on behalf of the guarantor), a company registered under Companies Act, 1956 (Banking Statute / body corporate constituted under the Banking Companies (Acquisition and Transfer of Undertakings) Act-V of 1970 having its registered office at _____(Address of Registered Office) (herein after called the "Guarantor" which expression shall, unless repugnant to the context of meaning thereof, include its successors and assigns) of the first part and M/s _____through _____(designation of the person signing the Bank Guarantee on behalf of the Supplier) company registered under Companies Act, 1956, having its registered office at _____(Address of registered office) (herein after called the "Supplier" which expression shall, unless repugnant to the context or meaning thereof, include its successors and assigns) of the second part and the Bhakra Beas Management Board, through its Chief Engineer/Transmission System a statutory body constituted under Section 79 (1) read with Section 80(6) of the Punjab Re-organization Act, 1966 (hereinafter called the 'Purchaser' which expression shall, unless repugnant to the context or meaning thereof, include its successors and assigns) of the third part.

2. WHEREAS _____ (name of Contractor) has submitted its Tender Offer No. _____dated ___ (Number and date of tender) (hereinafter called "the Tender") in response to purchaser's tender enquiry no. _____ dated _____ as per BBMB specification no. _____ and Purchase Order / LOA No.___ dated _____for _____ (Name of LOA) has been placed on the Contractor at the rates and on the terms and conditions contained in the purchase order / LOA.

3. And whereas under Clause - 16.4 of Section – II, i.e. Instruction to bidders (ITB) of BBMB Specification no. _____, the successful tenderer on whom the Letter of Award (LOA) is placed shall be required to submit the Security deposit for faithful and satisfactory execution of the LOA/Contract up to faithful execution of work

including AMC period without any exception to the exempted categories (refer clause 16.5 of Section – II, i.e. Instruction to bidders (ITB) @1% (One) of the ordered value rounded off to the multiple of Rs. 10/- on the higher side within 7 days of receipt of LOA through Bank Draft/ Bank Guarantee.

4. WHEREAS by these presents the 'Guarantor' is bound onto Purchaser in the sum of Rs. _____ (@1% (One) of the ordered value rounded off to the multiple of Rs. 10/- on the higher side) for which payment well and truly to be made to the said Purchaser, the Guarantor binds itself, its successors and assigns by these presents.

5. WHEREAS the conditions of this obligation are the following:

   a) If the P.O / LOA has been issued but the Contractor refuses to comply with it, irrespective of the fact whether the purchaser sustains any loss on account of his default or not. This forfeiture shall be without prejudice to the right of the purchaser to claim any other damages as admissible under the law as well as to take such executive action against the Contractor as blacklisting etc.
   b) Where the purchase order / LOA has been accepted but the Contractor stops making the supplies & services after partially fulfilling the purchase order / LOA and adjustment against any loss that may be caused to the purchaser though risk purchase from alternative source and/ or any other damage recoverable from the Contractor under the terms of the contract.
   c) In the event of a breach of contract in any manner.

The Guarantor hereby guarantees and undertakes to release and pay immediately to the Purchaser upto the above amount unconditionally upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser will note that the amount claimed by it is due to it, owing to the occurrence of one or more of the above named conditions and specifying the occurred condition or conditions, and the Contractor shall not have any right or cause to interfere.

And , it is agreed and declared by the Guarantor that the liability of the Guarantor to pay the said amount whenever called upon by the Purchaser shall be irrevocable and absolute and the Guarantor will not be entitled to dispute or inquire into

whether the purchaser has become entitled to forfeit the said amount as earnest money (or as security deposit) under the terms of the purchaser order/contract/LOA or not and entitled to claim the same or not or whether the Contractor has committed any breach of the purchase order/ contract/LOA or not or whether the purchaser is entitled to recover any damages from the Contractor for breach of terms thereof or not.

And it is further agreed and declared by the Guarantor that any waiver of any breach of any term of the said Purchase order/contract/LOA or any act of forbearance on the part of the Purchaser or any time given by the purchaser to the Contractor for carrying out and completing the work under the said purchase order/contract/LOA or any modifications made in the terms and conditions of the said purchase order/contract/LOA or any other act or omission on the part of the purchaser which could have in effect of discharging a surety will not discharge the Guarantor.

6. WHEREAS this Guarantee will remain in full force and effect till the warranty period of the complete equipment including the AMC period from the date of issue of Purchase Order/LOA. This guarantee shall be revalidated by the contractor subsequently for a further period, if required by the Purchaser. The Guarantor also agrees and undertakes not to revoke this guarantee within its validity period as aforesaid.
7. It is agreed and declared that this guarantee will be enforceable even if the Contractor's Company goes into liquidation or there is any change in the constitution of said company or management of the said company and shall ensure to the benefit of its successors and assigns and shall be binding on the successors and assigns of the Guarantor.
8. WHEREAS the Guarantor hereby further declares that this guarantee has been executed by its lawfully constituted attorney legally competent to sign and execute and has been stamped as required for such guarantees under the relevant Act of the State in which it has been executed and signed and this Guarantee shall not be effected by any change in constitution of the Guarantor or the Contractor.

9. WHEREAS the Guarantor and Contractor hereby further agree that any claim or dispute arising under this deed shall fall within the exclusive jurisdiction of courts at Chandigarh.

   Notwithstanding anything herein before contained, Guarantor's liability under this guarantee is restricted to Rs. _____/- (Rs _____only), (@1% (One) of the ordered value rounded off to the multiple of Rs. 10/- on the higher side). This guarantee shall remain in force until_____ , unless a claim in writing is presented to the Guarantor within six months from that date and if unpaid a suit or action to enforce such claim is filed against the Guarantor within said period of six months , all the rights of the Purchaser under the said guarantee shall be forfeited and the Guarantor shall be released and discharged from all liabilities thereunder.

   In witness whereof the parties hereto have put their respective hands on the day, month and the year first above mentioned.

Witness:- **For and on behalf of the Guarantor**

1. Signature, Name, Designation & Full address. Signature _____

2. Signature, Name, Designation & Full address. Name & Designation_____

   Full Address with Rubber Seal Full Address with Rubber Seal

Witness:- **For and on behalf of the Supplier**

1. Signature, Name, Designation & Full address. Signature _____

2. Signature, Name, Designation & Full address. Name & Designation_____

   Full Address with Rubber Seal Full Address with Rubber Seal

Witness:- **For and on behalf of the Purchaser**

1. Signature, Name, Designation & Full address. Signature _____

2. Signature, Name, Designation & Full address. Name & Designation_____

Full Address with Rubber Seal Full Address with Rubber Seal

ANNEXURE - 23

(WARRANTY DEED)

(To be executed on the appropriate value of Non-Judicial Stamp Papers by the successful bidder)

This warranty deed made this day the_____ _____ between M/s (contractor's name) through _____hereinafter referred to as "The contractor" which expression shall include its legal representatives, successors and assigns of the one part, and the Bhakra Beas Management Board, Chandigarh through Chief Engineer/ Transmission System, a statutory body constituted under Section 79 (1) read with Section-80 (6) of Punjab Re-organisation Act, 1966 hereinafter referred to as " the Board" which expression shall include its successors and assigns of the other part.

Whereas the Board has placed on the supplier P.O. / LOA No._____ _____ _____for _____ (Name of Work) as specifically and fully described in the said BBMB specification and whereas the above said P.O./LOA has been accepted by the contractor vide their letter No._____ thus constituting a legally enforceable contract between the parties above named.

NOW THEREFORE THIS DEED WITNESSTH AND THE CONTRACTOR HEREBY WARRANTIES AS UNDER:-

That the contractor shall be responsible to replace free of cost, with no transportation or insurance cost to the Board upto the destination, as specified in the said LOA./Specification or the Dispatch instructions issued in pursuance of the said LOA./Specification the whole or any part of the material which in normal and proper use proves defective in quality or workmanship subject to the condition that the defect is noticed within 12 months from the date of operational acceptance of plant as per Clause no. 71 i.e Defect Liability Period of Section IV (GCC) & Clause no. 73 i.e. Guarantee / Warranty of Section IV (GCC) BBMB specification of said LOA. The consignees or any other representative of the Board actually using the material will give prompt written notice of each such defect to the contractor. The replacement shall be affected by the contractor as per BBMB specification.

The contractor further declares that this deed has been executed by its lawfully constituted attorney legally competent to sign and execute and has been stamped as required under the relevant Act of the State in which it has been executed & signed and that the warranty herein before contained shall not be affected by any change in the constitution of the contractor.

In witness whereof the parties hereto have executed this deed on the date and year first above mentioned.

Witness:-

1. Signature:_____ For and on behalf of the supplier:
   Name & full address Signature:_____
2. Signature :_____ Name & Designation:-
   Name & full address.

Witness:-

1. Signature:_____ For and on behalf of the Board:-
   Name & full address:- Signature:_____
2. Signature:_____ Name & Designation:-
   Name & full address:

SECTION – VII

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SUB-SECTION VII-A

SCOPE OF WORKS

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1 PROJECT PARTICULARS

Particulars	Description	
Design and Engineering		
Proposed capacity of the Solar power plants (AC capacity)	Cumulative minimum 11.5 MW (AC) or higher capacity as quoted by bidder (minimum10MW (AC) or higher capacity at 400 kV substation Bhiwani and minimum1.5MW (AC) or higher capacity at 220kV BBMB substation Hisar	
Cell / Module Technology	Poly / Multi or Mono / Single Crystalline-Si	
Origin of Supply Items	As per MNRE Order on Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content) in respect of RE Sector dated 9th February, 2021 and subsequent amendments	
Module Mounting Structure Type	Fixed Tilt	
Design life of power plant	25 Years	
AMC period	5 (Five) Years extendable for another 5 (Five) years	
Site Location and Land Details		
Location	400 kV BBMB substation Bhiwani and 220kV BBMB substation Hisar	
Co-ordinates	Bhiwani	Hisar
	Latitude: 28.799046 Longitude: 76.133514	Latitude: 29.151861 Longitude: 75.721123
Available Land Area	40 Acres of Land at 400kV substation BBMB Bhiwani. 10 Acres of Land at 220kV substation BBMB Hisar	

	(Land shall be provided by BBMB)
District	Bhiwani & Hisar
State	Haryana
Land for Project	BBMB Land (Land shall be provided by BBMB
Purchaser of Project	Bhakra Beas Management Board (BBMB)
Design Parameters	
Wind Speed (IS 875)	Bhiwani – Zone IV, Hisar – Zone IV
Seismic Zone (IS 1893-1)	Bhiwani – Zone III, Hisar – Zone - II
Average Annual Rainfall	Bhiwani – 483 mm, Hisar – 450 mm
Access	
Nearest Urban Area	Bhiwani & Hisar
Nearest Highway	Bhiwani - NH 148B, Hisar – NH 10
Nearest Railway Station	Bhiwani & Hisar
Nearest Domestic Airport	IGIA, New Delhi
Electrical Interconnection	
Interconnecting Substation	Bhiwani site- BBMB 400kV substation Bhiwani Hisar site- BBMB 220kV substation Hisar.
Voltage Level (Voltage Level for Power Evacuation)	Bhiwani site- 132kV Hisar site - 33 kV
Distance to interconnecting substation	Proposed solar Plants sites are within the Premises of BBMB, Substation Bhiwani and Hisar respectively.
Metering Point (Interconnection / Metering / Delivery Point/ Point of connection with the BBMB	Bhiwani site- Interconnection is made at voltage level of 132 KV between the Solar Facility and the Grid of the BBMB (within BBMB 400 KV substation Bhiwani) .

	Hisar site- 33 KV between the Solar Facility and the Grid of the BBMB(within BBMB 220 KV substation Hisar) (For interconnection with grid and metering, the bidder shall abide by the relevant CERC Regulations, Grid Code and Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended and revised from time to time)
Meter Location	Bhiwani Site- Control Room 400kV Substation BBMB Bhiwani Hisar site- Control Room 220kV Substation BBMB Hisar
Performance Parameters	
Performance Ratio at Delivery Point (Metering Point)	78%
Annual Capacity Utilization Factor (CUF) at Delivery Point (Metering Point)	21% (minimum)
Other Details	
Water for Construction	To be arranged by the Contractor (As detailed in GCC)
Power for Construction	To be arranged by the Contractor (As detailed in GCC)

2 BRIEF SCOPE OF WORK

Scope of Supply & Work includes Design & Engineering, Procurement & Supply of equipment and materials, Testing at manufacturers works, multi-level inspections, packing and forwarding, supply, receipt, unloading and storage at site, associated civil works, services, permits, licenses, including statutory

approvals (as applicable), installation and incidentals, insurance at all stages, erection, testing and commissioning of cumulative capacity of minimum11.5 MW (AC) or higher as quoted by bidder at two different locations of BBMB {minimum 10MW (AC) or higher capacity at 400kV substation, BBMB Bhiwani and minimum 1.5MW (AC) or higher capacity at 220kV substation, BBMB Hisar} Grid Interactive Solar PV Power Plant and Performance demonstration with associated equipment and materials, handing over of the project to BBMB, Training etc. on Lump sum Turnkey basis along alongwith annual maintenance for five (5) extendable for another five (5) years from the date of Operational Acceptance.

All works shall be executed as per Technical Specifications given in Sub Section VII-B.

3 DESIGN AND ENGINEERING

3.1 The Contractor shall prepare the detailed design basis report (DBR) along with relevant standards (with respective clause description), PERT Chart and Master Drawing List (MDL). The Contractor shall submit a copy to Purchaser for review and approval.

3.2 All documents and drawings shall be submitted to the Purchaser both in soft as well as hard copies (5 nos.) for review and approval. In case of design calculations done in spread sheet, editable (working) soft copy of the spread sheet shall also be submitted along with ‘pdf’ copies during every submission. The Purchaser shall return, as suitable, either soft or hard copies to the Contractor with category of approval marked thereon. The drawings/documents shall be approved in any one of the following categories based on nature of the comments/ type of drawing or document.

- Category-I: Approved
- Category-II: Approved subject to incorporation of comments. Re-submit for approval after incorporation of comments
- Category-III: Not approved. Re-submit for approval after incorporation of comments

- Category-IV: Kept for record/ reference
- Category-IV (R): Re-submit for record/ reference after incorporation of comments.

  (Note: Approval of document neither relieves the Vendor/ Contractor of his contractual obligations and responsibilities for correctness of design, drawings, dimensions, quality & specifications of materials, weights, quantities, assembly fits, systems/ performance requirement and conformity of supplies with Technical Specifications, Indian statutory laws as may be applicable, nor does it limit the Purchaser's rights under the contract)

3.3 Submission of basic design data, design documents, drawings and engineering information including GTP and test reports to Purchaser or its authorized representative for review and approval in hard copy and soft copy from time to time as per project schedule. The documents typically include, but not limited to, the following:

- Solar insolation data and basis for generation
- Detailed technical specifications (GTP) of all the equipment
- General arrangement and assembly drawings of all major equipment
- Schematic diagram for entire electrical system (DC, AC and auxiliary systems)
- GTP & G.A. drawings for all types of structures/ components, 132 kV, 33 kV, 11 kV switchgears (as applicable) & other interfacing panels
- Test reports (for type, routine and acceptance tests)
- Relay setting charts
- Design calculations and sheets (licensed software as well as design templates)
- Geo technical investigation data and Topographical survey report including topographical survey data in digital format (Excel file) and Contour plan of the area.

- GA drawings of the entire project including equipment rooms/ inverter control rooms,
- Office cum control room, roads, storm water drainage, sewage networks, security gate, fire protection system, perimeter fencing, transformer yard fencing etc.
- Transmission line drawings and erection plans as per DISCOM/ STU/BBMB/CTU guidelines
- Quality assurance plans for manufacturing (MQP), Standard Operating procedure (SOP) and field activities (FQP)
- Detailed site EHS plan, fire safety & evacuation plan and disaster management plan.
- Detailed risk assessment and mitigation plan.
- Operation and Maintenance Instruction's and maintenance manuals for major equipment
- As-built drawings / documents and deviation list from good for construction (GFC)

3.4 Estimation of the plant generation based on Solar Radiation and other climatic conditions prevailing at site.

3.5 Design of associated civil, structural, electrical & mechanical auxiliary systems includes preparation of single line diagrams and installation drawings, manuals, electrical layouts, erection key diagrams, electrical and physical clearance diagrams, design calculations for Earth- mat, Bus Bar & Spacers indoor and outdoor lighting/ illumination etc., GTP and GA drawings for the major equipment including transmission line, design basis & calculation sheets, and other relevant drawings and documents required for engineering of all facilities within the periphery to be provided under this contract.

3.6 All drawings shall be fully corrected to match with the actual "As-Built" site conditions and submitted to Purchaser after commissioning of the project for record purpose. All as-built drawings must include the Good for Construction

deviation list.

3.7 The Evacuation of Power at Bhiwani & Hisar Sub-stations shall be at 132kV and 33kV voltage level respectively. However, the intermediate voltages of equipment's like IDT, Switchgears shall be as per the design and engineering submitted by the bidder and approved by the purchaser.

4 PROCUREMENT AND SUPPLY

The scope of procurement and supply including testing at manufacturer's works, packing, transit insurance, receipt, unloading, storage at site of equipment and materials for Grid Interactive Solar PV Power Plant with associated system shall be as per BBMB/STU/DISCOM/CTU norms and suitable for Power evacuation level i.e. 132 kV for Bhiwani site and 33 kV for Hisar site, include but not limited to the following.

4.1 Adequate DC capacity of Solar PV Modules so that desired CUF and Performance Ratio (PR) as mentioned in clause 1 i.e. Project Particulars under Section VII A. Scope of Works.

4.2 Module Mounting Structure (MMS) with necessary hardware suitable for mounting PV Modules.

4.3 String Combiner Box (SCB) along with mounting structure, in case of central inverter configuration.

4.4 Solar Cables of appropriate size and rating from PV Modules to SCB / Inverter along with straight/Y-connectors, ferrules, conduits, cable trays, cable ties and other materials required for cable laying and termination at both the ends.

4.5 Power Conditioning Units (Central / String Inverter) of appropriate rating.

4.6 DC Cables from of appropriate size and rating from SCB to Central Inverter along with cable termination kits, ferrules / tags, conduits, cable trays, cable ties and other materials required for cable laying and termination at both the ends.

4.7 AC Combiner Box / LT Switchgear panel of appropriate rating with adequate number of inputs for pooling of power from String Inverter to Inverter transformer.

4.8 AC Cables (LT & HT) of appropriate size and rating along with cable termination kits, ferrules / tags, conduits, cable trays, cable ties and other materials required for cable laying and termination at both the ends.

4.9 Inverter, Auxiliary and Power transformers of appropriate rating.

4.10 Outdoor Switchgear Panels of appropriate Voltage level 132kV, 33kV and 11kV (as per power evacuation voltage level) including Circuit Breakers, Current Transformers, Voltage Transformers, Relays and other accessories for complete protection.

4.11 Breakers and necessary protection arrangement at Solar Plant as per BBMB/STU/DISCOM/CTU norms.

4.12 ABT meters with all necessary metering rated CTs and PTs at the plant take-off point as well as at the interconnecting substation as per CEA Metering Regulations 2006 as amended time to time and state metering code.

4.13 Appropriate Voltage level (as per power evacuation voltage level) Over Head Transmission Line / Under Ground Cable including Poles / Towers, Conductors, Insulators, Cable Termination Kits and associated accessories from Plant take-off point to Interconnecting Substation as per DISCOM / STU/CTU/BBMB specifications/ requirements including Right of Way, permits and approvals, supervision and maintenance charges.

4.14 Appropriate Voltage level (as per power evacuation voltage level) Indoor / Outdoor Switchgear panel / bay and other associated accessories for integration of Solar PV Power Plant at the interconnecting substation as per DISCOM/CTU/BBMB/STU specifications / requirements including replacement of substation equipment / materials, permits and approvals, supervision and maintenance charges.

4.15 Construction of 132kV Bay at Bhiwani site and 33 KV at Hisar Site alongwith all protection equipment shall be required to be constructed for interconnection of solar substation and BBMB 400kV substation, Bhiwani and 220 KV substation Hisar respectively.

4.16 Auxiliary supply system including auxiliary transformers, distribution panels, cables and related accessories for plant internal consumption.

4.17 Uninterrupted Power Supply (UPS) including Batteries, Distribution Boards, Cables and associated equipment.

4.18 Battery Bank, Battery Charger, Distribution Boards, Cables and associated equipment.

4.19 LT Power and Control Cables including end terminations and other required accessories.

4.20 Communication cables including end terminations and other required accessories. Supervisory Control and Data Acquisition (SCADA) and for remote web-based communication & monitoring/control hardware, software etc. of plant facilities.

4.21 Data Acquisition System and communication infrastructure to transfer real time data to SLDC Chandigarh as per BBMB/DISCOM/STU/CTU specifications. Cost towards provision of data as Ethernet data at SLDC BBMB Chandigarh end either by VSAT or any other communication shall be borne by the Contractor.

4.22 GPS based Time Synchronization System: The SCADA system shall have a Master/Slave Clock system along with antenna, receiver, cabinet and internal interconnection cables. All SCADA controllers, servers, OWS and communicating equipment shall be synchronized to the GPS clock

4.23 Earthing system including earth strip/cables, earth electrodes, earth enhancing compound and all other associated materials for complete earthing of the plant.

4.24 Lightning Protection System for entire plant area.

4.25 LED luminaries with diffuser for indoor and outdoor illumination, lighting poles, distribution boxes and power supply cables along with required conduits, fittings, etc.

4.26 Weather monitoring station shall include but not be limited to the following:

- Pyranometers – One in Horizontal Plane for GHI and two in inclined plane for Global Tilted Irradiation/Irradiance (GTI) – Minimum 3 (Three) Nos.
- Ultrasonic Anemometer (wind speed and direction) – 1 (one) no.
- Temperature Sensor (ambient and module surface) – 3 (three) nos.

- Power source to the all sensors wherever required
- Data Logger

4.27 CCTV cameras with monitoring station along with mounting poles, power supply cables, communication cables, conduits, fittings, etc.

4.28 Fire detection and fire protection system in buildings/containers, inverter / transformer yard and switchyard.

4.29 Testing instruments as specified.

4.30 Robotic type dry cleaning system with micro-fibre based brushes (if applicable).

4.31 Mandatory spares as specified in Annexure – E.

4.32 All the protections of IDT/Power Transformer and other equipment's (as applicable) as per requirement shall be in contractor scope.

4.33 The Contractor shall establish forecasting tools for submitting schedule and comply with respective CERC Regulations on Forecasting, Scheduling and Deviation settlement of generation.

4.34 Any other equipment / material, not mentioned but required to complete the Solar Power Plant facilities in all respect.

4.35 Control Room equipment and furniture as required.

5 INSTALLATION, TESTING AND COMMISSIONING

The scope of installation, testing and commissioning for the plant facilities shall include, but not limited, to the following as per DISCOM/STU/CTU/BBMB specifications and norms:

5.1 Installation of PV Modules on Module Mounting Structure and interconnection of PV Modules.

5.2 Installation, Testing and Commissioning of String Combiner Box in case of Central Inverter configuration.

5.3 Installation, Testing and Commissioning of Power Conditioning Units (Central / String Inverter).

5.4 Laying of Solar cables through HDPE conduits with proper sealing along cable trays from PV Modules to SCB / String inverters along with termination at both the ends.

5.5 Installation, Testing and Commissioning of AC Combiner Box / LT Switchgear panel in case of String Inverter configuration.

5.6 Laying of DC cables along cable trays from SCB to Central inverter along with termination at both the ends in case of Central Inverter configuration.

5.7 Laying of AC LT cables along cable trays from AC Combiner Box / LT Switchgear panel to Inverter transformer along with termination at both the ends in case of String Inverter configuration.

5.8 Laying of AC LT cables along cable trays from Power Conditioning Unit to Inverter transformer along with termination at both the ends in case of Central Inverter configuration.

5.9 Installation, Testing and Commissioning of Inverter transformers, Auxiliary Transformer and Power Transformer.

5.10 Installation, Testing and Commissioning of 132kV,33KV and 11 kV (As per Evacuation Voltage level) Switchgear panels.

5.11 Installation, Testing and Commissioning of Breakers and necessary protection arrangement at Solar Plant as per DISCOM/STU/CTU/BBMB specifications and norms.

5.12 Installation, Testing and Commissioning of ABT meters with all necessary metering rated CTs and PTs at Plant take-off point as well as at Interconnecting Substation as per CEA Metering Regulations 2006 as amended time to time and state metering code.

5.13 Installation, Testing and Commissioning of Appropriate Voltage level (as per power evacuation voltage level) Over Head Transmission Line / Underground Cable from Plant take-off point to Interconnecting Substation.

5.14 Installation, Testing and Commissioning of Appropriate Voltage level (as per power evacuation voltage level) Switchgear panels / bay and associated accessories for integration of Solar PV Power Plant at the interconnecting

substation including rearrangement of substation equipment / materials.

Construction of 132kV Bay at Bhiwani site and 33KV at Hisar site alongwith all protection equipment shall be required for interconnection of solar substation and BBMB 400kV substation, Bhiwani and 220KV substation Hisar respectively, in contractor scope.

5.15 Installation, Testing and Commissioning of auxiliary power supply system consisting of auxiliary transformers, AC distribution boards, AC LT cables and related accessories.

5.16 Installation, Testing and Commissioning of Uninterrupted Power Supply (UPS), Distribution boards, Cables and related accessories.

5.17 Installation, Testing and Commissioning of Battery Bank, Battery Charger, Distribution boards, Cables and related accessories.

5.18 Laying of LT Power and Control Cables along with termination at both the ends.

5.19 Installation, Testing and Commissioning of SCADA along with suitable communication system for interfacing PCU, Transformer, HT Panel, UPS, Fire alarm panel, WMS and other equipment with SCADA, remote web-based monitoring capabilities and internet facility equipped with functionality as per Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019 and amendments.

5.20 Installation, Testing and Commissioning of Telemetry System for communication as per Central Electricity Authority (Technical Standards for Communication System in Power System Operations) Regulations, 2020 and amendments.

5.21 Earthing of PV Modules, Module Mounting Structures, PCU, Switchgear panels, Transformers, and all other electrical equipment.

5.22 Installation of lightning protection system for entire plant facilities.

5.23 Installation of indoor & outdoor illumination system including all required accessories and laying of power supply cables.

5.24 Installation, Testing and Commissioning of Weather Monitoring Station along with laying of required power supply and communication cables.

5.25 Installation of CCTV cameras on strategic locations including all required accessories, laying of power/communication cables and installation of monitoring station.

5.26 Installation of fire detection and fire protection system for buildings/containers, transformer yard and switchyard.

5.27 Pre-commissioning checks and tests for all equipment.

5.28 Synchronization and Commissioning of plant.

5.29 The Contractor shall install forecasting tools for submitting schedule and comply with respective CERC Regulations on Forecasting, Scheduling and Deviation settlement of generation.

5.30 Any other works related to installation, testing and commissioning not mentioned but required to complete the Solar Power Plant facilities in all respect.

6 CIVIL WORKS

The scope of civil works for the plant facilities shall include, but not limited, to the following.

6.1 Conducting geotechnical investigation and topographical survey of the plant area.

6.2 Clearing plant site and transmission line corridor by cutting of trees, bushes and shrubs including disposal of waste material.

6.3 Earthwork for site grading, cutting, filling, levelling and compaction of land.

6.4 Construction of foundation for Module Mounting Structure (MMS) and erection of MMS.

6.5 Construction of foundation and / or mounting structure for String Combiner Box, AC Combiner Box / LT Switchgear panel, Inverter, Inverter Transformer, Auxiliary Transformer, Power Transformer, Appropriate Voltage level (as per power evacuation voltage level) Switchgear panel, Metering panel and other electrical equipment including bay for 132kV at Bhiwani and 33KV at Hisar.

6.6 Construction of fence for Transformer yard and Switchyard.

6.7 Construction of foundation and / or mounting structure for Weather Monitoring Station and associated civil works.

6.8 Construction of foundation for Lighting poles, CCTV poles and other equipment. Construction of foundation for Appropriate Voltage level (as per power evacuation voltage level) Overhead Transmission Line from Plant take-off point to Interconnecting Substation and associated civil works.

6.9 Construction of foundation and / or mounting structure for Appropriate Voltage level (as per power evacuation voltage level) Switchgear panels / bay and associated accessories for integration of Solar PV Power Plant at the Interconnecting Substation.

6.10 Construction of underground water tanks, plumbing network for construction and cleaning of PV Modules (in case of wet-type module cleaning system).

6.11 Construction of internal roads and peripheral roads, as applicable.

6.12 Construction of storm water drainage & sewage network including rain water harvesting mechanism.

6.13 Slope protection works for existing drain, if any.

6.14 Suitable arrangement of water shall be ensured to cater permanent water supply for module cleaning (in case of wet-type module cleaning system) and other needs of SPV power plant during entire AMC period.

6.15 Any other civil works not mentioned but required to complete the Solar Power Plant facilities in all respect.

7 STATUTORY APPROVALS

7.1 Obtaining statutory approvals /clearances/ compliances on behalf of the Purchaser from various Government Departments, not limited to, the following:

- Pollution control board clearance, if required.
- Mining Department, if required.
- Forest Department, if required.

- All other approval as and when, as necessary for setting up of the solar power plant including Chief Electrical Inspector to Government (CEIG)/ Central Electricity Authority (CEA), NRPC, Connectivity, Power evacuation, Railways, Port trust, etc. as per suggested guidelines.
- Open Access approvals if any.

7.1.1 All statutory approvals/permissions and/or No Objection Certificates (NoC) etc. from DISCOM / STU/CTU/BBMB for obtaining connectivity at the substation as per Project Particulars provided above including approval from Chief Electrical Inspector.

7.1.2 All other statutory approvals and permissions and their respective compliances, not mentioned specifically but are required to carry out hassle free Construction and AMC of the plant.

7.1.3 Adequate and seamless insurance coverage during EPC and AMC period to mitigate all risks related to construction and AMC of the plant to indemnify the BBMB.

7.2 The Contractor shall comply with the provision of all relevant acts of Central or State Governments including payment of Wages Act 1936, Minimum Wages Act 1948, Purchaser's Liability Act 1938, Workmen's Compensation Act 1923, Industrial Dispute Act 1947, Maturity Benefit Act 1961, Mines Act 1952, Employees State Insurance Act 1948, Contract Labour (Regulations & Abolishment) Act 1970, Electricity Act 2003, Grid Code, Metering Code, MNRE guidelines or any modification thereof or any other law relating whereto and rules made there under or amended from time to time.

8 COMPREHENSIVE ANNUAL MAINTENANCE

The period of AMC will be deemed to commence from the date of Operational acceptance. AMC shall be initially for period of 5 (Five) years and provision of further extendable for another 05 (Five) years on same terms and conditions as approved by BBMB.

8.1 Total AMC of the SPV Plant shall be with the Contractor, after operational

acceptance of the plant till culmination of the AMC period and shall include deployment of engineering personnel, technicians etc., which are qualified and experienced to maintain and monitor the facility and to coordinate maintenance of the facility with the Grid system for the full capacity.

8.2 Any damage to Civil/Electrical/Mechanical/C&I components of the plant is to be reworked/replaced/supplied without any extra cost and time by the Contractor during maintenance period.

8.3 It is the responsibility of the Contractor to perform the necessary maintenance/ timely replacement of all Civil /Mechanical or Electrical components of the project during this AMC period such that the guaranteed performance of the plant is not compromised. Any damage to Civil/Electrical/Mechanical/C&I components of the plant is to be reworked/ replaced/ supplied without any extra cost in time by the Contractor during complete AMC period. The AMC shall be comprehensive. The maintenance service provided shall ensure project functioning of the Solar PV system as a whole and Power Evacuation System to the extent covered in the Contract.

8.4 All preventive/ routine maintenance and breakdown/ corrective maintenance required for ensuring maximum uptime shall have to be provided. Accordingly, the Comprehensive AMC shall have two distinct components as described below:

a) Preventive / Routine Maintenance: This shall be done by the Contractor regularly and shall include activities such as cleaning and checking the health of the Plant, cleaning of module surface, tightening of all electrical connections, and any other activity that may be required for proper functioning of the Plant as a whole. Necessary maintenance activities, preventive and routine for Transformers and associated switchgears also shall be included.

Soil treatment against termite and anti-weeding, clearing bushes in the solar field etc., as per the direction of Purchaser's/Site- In-charge

b) Breakdown/ Corrective Maintenance: Whenever a fault has occurred, the Contractor has to attend or to rectify the fault. The fault must be rectified within 48 hrs time from the time of occurrence of fault failing which the

Contractor will be penalized as per terms and conditions of this Tender.

8.5 To carry out periodic overhauls or maintenance required as per the recommendations of the original equipment manufacturer (OEM) and to furnish all such periodic maintenance schedules at the time of plant commissioning/ start of AMC contract

8.6 The contractor shall be responsible for all the required activities for the successful running, committed energy generation & maintenance of the Solar Photovoltaic Power Plant .

8.7 Procurement of spare parts, overhaul parts, tools & tackles, equipment, consumables, etc. required for smooth operation and maintenance of the plant as per prudent/ standard utility practices, OEM recommendations and warranty clauses for the entire AMC period.

8.8 Replacement of Modules, Invertors/PCU's and other equipment as and when required during the AMC period without additional cost to Purchaser. Continuous monitoring the performance of the Solar Power Plant and regular maintenance of the whole system including Modules, PCU's, transformers, overhead line, outdoor/indoor panels/ kiosks etc. are necessary for extracting and maintaining the maximum energy output from the Solar Power Plant.

8.9 Preventive and corrective AMC of the Solar Photovoltaic Power Plant including supply of spares, consumables, wear and tear, overhauling, replacement of damaged modules, invertors, PCU's and insurance covering all risks (Fire & allied perils, earth quake, terrorists, burglary and others) as required.

8.10 All the equipment required for Testing, Commissioning and operation and maintenance for the healthy maintenance of the Plant must be calibrated, time to time, from the NABL accredited labs and the certificate of calibration must be provided prior to its deployment.

8.11 The Contractor shall ensure that all safety measures are taken at the site to avoid accidents to his or his sub-contractor or Purchaser's Workmen. This will include procurement of all safety gadgets during Construction and AMC period including but not limited to, rubber mats of appropriate grade, PPE, rubber gloves and suitable shoes etc.

8.12 Contractor shall maintain an inventory of spare parts, tools, equipment, consumables and supplies for the facility's operation along-with required details of recommended spares list with all associated information regarding replacement records, supplier details, tentative cost, storage details, specifications on the basis of replacement frequency and mean time between failures and mean time to restore at the culmination of penultimate year under AMC period.

8.13 Transportation for contractor staff in bidders' scope during AMC period.

8.14 Contractor shall be responsible for maintenance of all each and every civil infrastructure part like cable trench, drain, plumbing system fire-fighting system, CCTV system, road, earthing, any foundations, anti-weeding, clearing bushes in the solar field etc., as per the direction of Purchaser's/Site- In-charge.

8.15 Maintenance procedures such as preparation to starting, running, routine Maintenance with safety precautions, monitoring etc., shall be carried out as per the manufacturer's instructions to have trouble free Operation and maintenance of the complete system.

8.16 Daily work of the maintenance in the Solar Photovoltaic Power Plant involves periodic cleaning of Modules including tilt angle change as and when required, logging the voltage, current, power factor, power and energy output of the Plant at different levels. The operator shall also note down time/ failures, interruption in supply and tripping of different relays, reason for such tripping, duration of such interruption etc. The other task is to check battery voltage-specific gravity and temperature. Keep record of monthly energy output, down time, etc.

8.17 Earth resistance of Plant as well as individual earth pit is to be measured and recorded every month. If the earth resistance is high (compared to standards) suitable action is to be taken to bring down the same.

8.18 A maintenance record is to be maintained to record the regular maintenance work carried out as well as any breakdown maintenance along with the reasons for the breakdowns and steps taken to attend the breakdown, duration of the breakdown etc.

8.19 The Preventive Maintenance Schedules will be drawn such that some of the

jobs other than breakdown, which may require comparatively long stoppage of the Power Plant, shall be carried out preferably during the non-sunny days or evenings. Prior information shall be provided to the Purchaser for such preventive maintenance prior to start.

8.20 The Contractor will attend to any breakdown jobs immediately for repair/ replacement/ adjustments and complete at the earliest working round the clock. During breakdowns (not attributable to normal wear and tear) in AMC period, the Contractor shall immediately report the accidents, if any, to the Purchaser showing the circumstances under which it happened and the extent of damage and/or injury caused.

8.21 During AMC the contractor shall at his own expense provide all amenities to his workmen as per applicable laws and rules.

8.22 If negligence / mal operation of the contractor's results in failure of equipment, such equipment should be repaired/replaced by the contractor free of cost.

Note: - Any other activities required for maintenance of the full capacity of project, but not specified in the above shall be in the scope of contractor.

SUB-SECTION VII-B

TECHNICAL SPECIFICATIONS

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DISCLAMIER:

1. Though adequate care has been taken while preparing the Bidding documents, the Bidders/Applicants shall satisfy themselves that the document is complete in all respects. Intimation of any discrepancy shall be given to this office immediately. If no intimation is received from any Bidder within ten (10) days from the date of notification of NIT/ Issue of the NIT documents, it shall be considered that the NIT documents are complete in all respects has been received by the Bidder.
2. BBMB, reserves the right to modify, amend or supplement this NIT documents including all formats and Annexures.
3. While this bidding documents have been prepared in good faith, neither BBMB/Purchaser/ or its authorized representatives nor their employees make any representation or warranty, express or implied, or accept any responsibility or liability, whatsoever, in respect of any statements or omissions herein, or the accuracy, completeness or reliability of information, and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of this bidding documents, even if any loss or damage is caused by any act or omission on their part.

4. The specifications mentioned for all the equipment which include Solar modules, PCU, combiner boxes, DC cables, module mounting structures, transformer, CT, PT, LT/ HT cables, interfacing panels, switch gears & other associated equipment etc., to complete the power generation and evacuation to the designated substation, in the present bidding documents are for the reference only. It is subject to revise/ alter as per the design/ planning/ good engineering practices etc., to be carried out by the selected bidder, to the satisfaction of the Purchaser or its authorized representatives. It is advised that the bidders must satisfy himself with the prevailing site conditions before design/ plan. The design must be optimized as per the site conditions and directed to achieve the maximum output from the installed capacity at all times. Moreover, the components not separately mentioned, but are required to complete the plant for operation is also included in the scope of bidder and shall be vetted by the Purchaser or its authorized representatives.

Place (Signature)

Date: Name and Designation of bidder

A. DESIGN PHILOSOPHY

1. **The main objective of the design philosophy is to construct the plant with in-built Quality and appropriate redundancy to achieve high availability and reliability with minimum maintenance efforts**. In order to achieve this, the following principles shall be adopted while designing the system.

   i) Adequate capacity of SPV modules, PCUs, Junction boxes etc. to ensure generation of power as per design estimates. This will be done by applying liberal de-rating factorsfor the array and recognizing the efficiency parameters of PCUs, transformers, conductor losses, system losses, site conditions etc.

   ii) Use of equipment and systems with proven design and performance that have high availability track records under similar service conditions.

   iii) Selection of the equipment and adoption of a plant layout to ensure ease of maintenance.

   iv) Strict compliance with approved and proven quality assurance (QA) systems and procedures during different stages of the project, starting from sizing, selection of make, shipment, storage (at site), during erection, testing and commissioning.

   v) Proper monitoring of synchronization and recording, to ensure availability of power to the grid.

   vi) The plant instrumentation and control system should be designed to ensure high availability and reliability of the plant to assist the operators in the safe and efficient operation of the plant with minimum effort.

   vii) It should also provide the analysis of the historical data and help in the plant maintenance people to take up the plant and equipment on predictive maintenance.

   viii) System design shall have intelligent protection mechanism which may include very fast responsive microprocessor-based relays etc., so that any disturbance from the grid will not cause any damage to the equipment of the Solar Power Plant.

2. The basic and detailed engineering of the plant shall aim at achieving high standards ofoperational performance especially considering following:

i) SPV power plant should be designed to operate satisfactorily in synchronization with the grid within permissible limits of high voltage and frequency fluctuation conditions. Itis also extremely important to safeguard the system during major disturbances, internal and external surge conditions while ensuring safe operation of the plant.

ii) The Module Mounting Structures shall be designed for such that SPV arrays produce maximum energy during the period of respective tilt.

iii) Shadow free plant layout to ensure minimum losses in generation during the day time.

iv) Higher system voltage and lower current options to be followed to minimize ohmic losses.

v) Selection of PCUs with proven reliability and minimum downtime. Ready availability of requisite spares.

vi) Careful logging of operational data / historical information from the Data Monitoring Systems, and periodical analysis of the same to identify any abnormal or slowly deteriorating conditions.

vii) The designed array capacity at STC shall be suitably determined to meet the proposed guaranteed generation output at the point of interconnection (metering Point) by the contractor in his bid. The contractor shall take care of first year degradation also by installing additional DC capacity as the CUF calculations will not factor the first-year degradation of the modules.

viii) Each component offered by the bidder shall be of established reliability. The minimum target reliability of each equipment shall be established by the bidder considering its mean time between failures and mean time to restore, such that the availability of complete system is assured. Bidder's recommendation of the spares shall be on the basis of established reliability.

ix) Bidder shall design the plant and equipment in order to have sustained life of 25 years with minimum maintenance efforts.

x) Enclosure of all electrical equipment installed outdoor, if applicable, shall be painted according to C5 (High) corrosive category as per ISO 12944-5.

xi) The work execution planning for supply, erection, commissioning and all other

allied works for SPV Power Plant shall be such that it is completed within stipulated time from the date of Letter of Award (LOA).

3. **The specifications provided with this bid document are functional ones; any design provided in this document is only meant as an example. The Contractor must submit a detailed design philosophy document for the project to meet the functional requirements based upon their own design in-line with the above. The bidders are advised to visit the site and satisfy themselves before bidding**.

B. ELECTRICAL SYSTEM

1. PHOTOVOLTAIC MODULES

1.1 STANDARDS AND CODES

Photovoltaic Modules shall comply with the specified edition of the following standards and codes.

Standard	Description
IEC 61215-1:2016Ed.1	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements
IEC 61215-1-1:2016Ed.1	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon PV modules
IEC 61215-1-2:2016Ed.1	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-2: Special requirements for testing of thin-film Cadmium Telluride (CdTe) based photovoltaic (PV) modules
IEC 61730-1:2016Ed.2	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction
IEC 61730-2:2016Ed.2	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing

IEC 61701:2011Ed.2	Salt mist corrosion testing of photovoltaic (PV) modules – Severity 1
IEC 62716:2013Ed.1	Photovoltaic (PV) modules - Ammonia corrosion testing (if applicable)
IEC TS 62804-1:2015Ed.1	Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation - Part 1: Crystalline silicon (under conditions of 85oC/85% RH for minimum 192 hours)
As per the Solar Photovoltaics, Systems, Devices and Components Goods (Requirements for Compulsory Registration) Order, 2017, PV Modules used in the grid connected solar power projects shall be registered with BIS and bear the Standard Mark as notified by the Bureau of Indian Standards. Further, PV Modules should have been included in the ALMM list as per MNRE Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order, 2019 and amendments.	

1.2 TECHNICAL REQUIREMENTS

Parameter	**Specification**
Cell/ Module Technology	Mono-crystalline or Multi-crystalline
Size of Solar Module	Min. 330W or above.
Module Efficiency	≥ 17% for Multi-crystalline ≥ 19% for Mono-crystalline
Rated power at STC	No negative tolerance is allowed
Temperature co-efficient of power	Not less than -0.40%/°C
Application Class as per IEC 61730	Class A

1.3 SUPPLIER QUALIFICATION CRITERIA

The PV Module Supplier shall be Class-I local supplier as per MNRE Order on Public Procurement (Preference to Make in India) to provide for Purchase Preference (linkedwith local content) in respect of Renewable Energy (RE) Sector dated 9th February, 2021 and subsequent amendments.

1.4 COMPONENT SPECIFICATIONS

1.4.1 The PV Modules glass panel shall be:

i) For PV Modules with back sheet, toughened low iron glass with minimum thickness of 3.2 mm for multi or mono-crystalline modules.

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

iii) The glass used shall have transmittance of above 90%.

1.4.2 The back sheet used in the PV modules shall be three-layered structure with outer (air side) layer having fluoropolymer or a material with superior UV stability properties.The back sheet shall have the following properties.

Parameter	**Value**
Material thickness	≥ 300 micron
Water vapour transmission rate	< 2 g/m^2/day
Partial discharge test voltage	≥ 1500 V
Elongation at break	> 100%
Adhesion strength with encapsulant	> 40 N/cm
Interlayer adhesion strength	> 4 N/cm

The Purchaser reserves the right to conduct Pressure Cooker (PC) test/ Highly Accelerated Stress Test (HAST) to confirm the durability of the back sheet in accelerated conditions.

1.4.3 The encapsulant used for the PV modules should be UV resistant and PID resistant in nature. No yellowing of the encapsulant with prolonged exposure shall occur. The encapsulant shall have the following properties.

Parameter	**Value**
Gel content	> 75%
Volume resistivity	> 1×10^{14} Ω.cm
Peeling strength with glass	> 40 N/cm

1.4.4 The sealant used for edge sealing of PV modules shall have excellent moisture ingress protection with good electrical insulation (Break down voltage >15 kV/mm) and with good adhesion strength. Edge tapes for sealing are not allowed.

1.4.5 The module frame shall be made of anodized Aluminum, which shall be electrically & chemically compatible with the structural material used for mounting the modules. It is required to have provision for earthing to connect it to the earthing grid. The anodization thickness shall not be less than 15 microns.

1.4.6 The material used for junction box shall be UV resistant to avoid degradation during module life. The degree of protection of the junction box shall be at least IP 67. Minimum three number of bypass diodes and two number of IEC 62852/EN 50521 certified MC4 compatible connectors with appropriate length of IEC 62930/EN 50618 certified 4 sq.mm copper cable shall be provided. The cable length shall be in accordance with the PV Module wiring strategy and adequate to ensure that the cable bending radius standard is not exceeded.

1.4.7 Each PV Module shall be provided a RFID tag which is embedded inside the module lamination and must be able to withstand harsh environmental conditions. The RFID data base shall contain the following information. RFID scanner and database of all the modules containing the following information shall also be provided.

i) Name of the manufacturer of PV Module

ii) Name of the Manufacturer of Solar cells

iii) Type of cell: Mono / Multi

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

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

vi) I-V curve for the module

vii) Peak Wattage, Im, Vm and FF for the module

viii) Unique Serial No. and Model No. of the module.

ix) Date and year of obtaining IEC PV module qualification certificate

x) Name of the test lab issuing IEC certificate

xi) Other relevant information on traceability of solar cells and modules as per ISO 9000 series.

1.5 WARRANTY

1.5.1 PV modules must be warranted with linear degradation rate of power output except for first year (maximum 3% including LID) and shall guarantee 80% of the initial rated power output at the end of 25 years.

1.5.2 The modules shall be warranted against all material/ manufacturing defects and workmanship for minimum of 10 years from date of operational acceptance.

1.5.3 The above warranties shall be backed by third party insurance

1.6 APPROVAL

1.6.1 The Contractor shall provide Guaranteed Technical Particular (GTP) datasheet and Bill of Materials (BOM) of the module that is submitted for approval along with the datasheets of each component. The component datasheet shall contain all the information to substantiate the compliance for component specifications mentioned above.

1.6.2 The Contractor shall also provide test certificates corresponding to the standards mentioned above along with complete test reports for the proposed module. The tests should have been conducted at a test laboratory compliant with ISO 17025 for testing and calibration and accredited by an NABL/ILAC/IECEE member signatory. Laboratory accreditation certificate or weblink along with scope of accreditation shall also be submitted.

1.6.3 The BOM proposed shall be the subset of Constructional Data Form (CDF)'s of all the test reports.

1.6.4 The Contractor shall submit a detailed Manufacturing Quality Plan (MQP) for the PV Module with list of checks/tests performed during incoming material inspection, production, pre-dispatch and package.

1.6.5 The Contractor shall obtain the approval of the proposed module make & model prior to manufacturing.

1.7 MANUFACTURING AND INSPECTION

1.7.1 The Contractor shall inform the module manufacturing schedule to the Purchaser at least 15 (Fifteen) days before the start of proposed schedule.

1.7.2 The Purchaser shall perform material inspection at the Manufacturer's factory before the start of proposed manufacturing schedule. Proof of procurement of components as per the approved BOM mentioning manufacturer name, manufacturing date and relevant test certificate shall be submitted during material inspection for verification.

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

1.7.4 The cells used for module making shall be free from all defects like edge chipping, breakages, printing defects, discoloration of top surface etc. Only Class A solar cell shall be used.

1.7.5 The modules shall be uniformly laminated without any lamination defects.

1.7.6 Current binning of modules shall be employed to limit current mismatch of modules. Different colour codes shall be provided on the modules as well as pallet for identification of different bins. Maximum three nos. of bins will be allowed for each module rating.

1.7.7 Pre-dispatch inspection of modules shall be performed as per the inspection protocolattached in Annexure – A.

1.8 TRANSPORTATION, HANDLING, STORAGE AND INSTALLATION

1.8.1 Transportation, handling, storage and installation of modules shall be in accordance with the manufacturer manual so as not to breach warranty conditions. The Standard Operating Procedure (SOP) for the same shall be

shared by the Contractor prior to dispatch.

1.8.2 It is required to construct a temporary platform (graded) while keeping the modules at least above the highest flood level. If the contractor scheduled/ planned to mount the modules immediately after the receipt at site, then the module shall be kept in common storage area with proper arrangement.

1.8.3 Modules shall be dispatched in line with the Construction schedule. If Modules are dispatched ahead of schedule, following measures shall be undertaken:

Modules shall be covered with tarpaulin sheet. Alternatively, the Modules, properly stacked as per OEM recommendations, shall be stores under a temporary shed. Further, the temporary platform for keeping the modules shall be treated with anti- termite treatment.

2. STRING COMBINER BOX (SCB)

2.1 STANDARDS AND CODES

Standard/Code	Description
IEC 60529	Enclosure Ingress Protection
IEC 62262	Enclosure Impact Protection
IEC 60269	Fuse
IEC 61643-11	Surge Protection Device
IEC 62852 or EN 50521	Solar cable connector
IEC 60695-2-11	Fire hazard testing

2.2 CONSTRUCTION

2.2.1 SCB enclosure shall be made of UV resistant, fire retardant, thermoplastic material. Enclosure degree of protection shall be at least IP 65 and mechanical impact resistance shall be at least IK08.

2.2.2 Not more than two strings can be connected in parallel to a single input of SCB. One spare input terminal along with connector shall be provided for each SCB.

2.2.3 Every SCB input shall be provided with fuses on both positive and negative side. In case of negative grounded system, fuse at positive side only is acceptable. The rating of the fuses shall be selected such that it protects the modules from reverse current overload. The fuses shall be 'gPV' type conforming to IEC 60269-6.

2.2.4 DC switch disconnector of suitable rating shall be provided at SCB output to disconnect both positive and negative side simultaneously.

2.2.5 Type-II surge protective device (SPD) conforming to IEC 61643-11/IEC 61643-31/ EN 50539-11 shall be connected between positive/negative bus and earth.

2.2.6 MC4 connector conforming to IEC 62852 or EN 50521 shall be provided at each SCB input. Cable gland (double compression metallic) of suitable size for DC cables shall be provided at the SCB output.

2.2.7 UV resistant printed cable ferrules for solar cables and punched/ embossed aluminium tags for DC cables shall be provided at cable termination points for identification.

2.3 WARRANTY

The SCB unit shall be warranted against all material/ manufacturing defects and workmanship for minimum 12 (Twelve) months from the date of operational acceptance i.e. upto defect liability Period.

2.4 TESTS

Routine tests and acceptance tests for the assembled unit shall be as per the Quality Assurance Plan (QAP) approved by the Purchaser.

3. SOLAR AND DC CABLES

3.1 STANDARDS AND CODES

Cable	From	To	Conductor/ Insulation	Voltage Rating	Applicable Standard
Solar Cable*	Module	SCB	Copper/ XLPO	1.5 kV DC	IEC 62930 / EN 50618
DC Cable	SCB	PCU	Copper or Aluminium/ XLPE	1.5 kV DC	IS 7098 Part II
* Cable used for module interconnection shall also be referred as solar cable.					

3.2 Solar cable outer sheath shall be flame retardant, UV resistant and black in colour. Solar cable with positive polarity should have marking of red line on black outer sheath.

3.3 DC cables shall be single core, armoured, Flame Retardant Low smoke (FRLS), PVC outer sheath conforming to IS 7098-II. DC cable with positive polarity should have marking of red line on black outer sheath.

3.4 In addition to manufacturer's identification on cables as per relevant standard, following marking shall also be provided over outer sheath.

i) Cable size and voltage grade

ii) Word Flame Retardant Non-corrosive ('FRNC) / FRLS' (as applicable) at every meter

iii) Sequential marking of length of the cable in meters at every meter

3.5 Cables shall be sized based on the following considerations:

i) Rated current of module

ii) In case of central inverters, average voltage drop in the cables (from PV Modules to PCU) shall be limited to 1.5 % of the rated voltage. In case of string Inverters, average voltage drop (from PV module to string inverter) shall be limited to 0.5% of the rated voltage drop. The Contractor shall

provide voltage drop calculations in excel sheet.

iii) Short circuit withstand capability

iv) De-rating factors according to laying pattern.

3.6 WARRANTY

The cables (Solar and DC) shall be warranted against all material/ manufacturing defects and workmanship as per warranty clause for minimum 12 (Twelve) months from the date of operational acceptance i.e. up to defect liability Period.

3.7 TESTS

Type test, routine test and acceptance tests requirements shall be as per IEC 62930/EN 50618 for solar cables and IS 7098-II for DC cables.

3.8 INSTALLATION

3.8.1 Cable installation shall be as per IS 1255.

3.8.2 Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted.

3.8.3 Solar cables shall be provided with UV resistant printed ferrules and DC cables shall be provided with punched/ embossed aluminium tags. The marking shall be done with good quality letter and numbers of proper size so that the cables can be identified easily.

3.8.4 Cable terminations shall be made with properly crimped lugs and passed through cable glands at the entry & exit point of the cubicles. Bimetallic lugs shall be used for connecting Cu bus bar and Al cables or vice-versa.

3.8.5 Solar cables, wherever exposed to direct sunlight, shall be laid through Double Wall Corrugated (DWC) HDPE conduits. The size of the conduit or pipe shall be selected on the basis of 40% fill criteria.

3.8.6 Solar cables shall be aesthetically tied to Module Mounting Structure using UV

resistant cable-ties suitable for outdoor application.

3.8.7 All cables shall be laid along overground cable trays with cable cleats/ties ensuring minimum clearance of 500 mm above FGL.

3.8.8 CABLE TRAYS

3.8.8.1 Cable trays shall be horizontal ladder/perforated type complete with matching fittings (like brackets, elbows, bends, reducers, tees, crosses, etc.), accessories (like side coupler plates, etc. and hardware (like bolts, nuts, washers, G.I. strap, hook etc.) as required.

3.8.8.2 Cable trays, fittings and accessories shall be fabricated out of rolled mild steel sheets free from flaws such as laminations, rolling marks, pitting etc. and shall be hot dip galvanized as per relevant IS codes.

3.8.8.3 Cable trays shall have standard width of 150 mm, 300 mm & 600 mm and standard lengths of 2.5 meter. Thickness of mild steel sheets used for fabrication of cable trays and fittings shall be minimum 2 mm. The thickness of side coupler plates shall be minimum 3 mm.

3.8.8.4 Cable troughs shall be required for branching out few cables from main cable route. These shall be U-shaped, fabricated of mild steel sheets of thickness 2 mm and shall be hot dip galvanized as per relevant IS codes. Troughs shall be standard width of 50 mm & 75 mm with depth of 25 mm.

4. POWER CONDITIONING UNIT

PCU shall be outdoor type. For Outdoor PCU (without containerized solution), the complete assembly should be placed inside a shed made of structural steel section preferably tubular/hollow section and colour coated metal sheets for roof with base metal Thickness (BMT) 0.5 mm and at least 60cm projection in all side. Structural steel and paints for shed shall be as per ISO 12944-5.

4.1 STANDARDS AND CODES

Power Conditioning Unit (PCU) shall comply with the specified edition of the

following standards and codes.

Standard	Description
IEC 61683 Ed. 1	Photovoltaic systems – Power conditioners – Procedurefor measuring efficiency
IEC 62109-1 Ed. 1	Safety of power converters for use in photovoltaic powersystems – Part 1: General requirements
IEC 62109-2 Ed. 1	Safety of power converters for use in photovoltaic powersystems – Part 2: Particular requirements for inverters
IEC 61000-6-2 Ed. 2	Electromagnetic compatibility (EMC) – Part 6-2: Genericstandards – Immunity standard for industrial environments
IEC 61000-6-4 Ed. 2.1	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrialenvironments
IEC 62116 Ed. 2	Utility-interconnected photovoltaic inverters – Testprocedure of islanding prevention measures
IEC 60068-2-1:2007	Environmental testing – Part 2-1: Tests – Test A: Cold
IEC 60068-2-2:2007	Environmental testing – Part 2-2: Tests – Test B: Dryheat
IEC 60068-2-14:2009	Environmental testing – Part 2-14: Tests – Test N:Change of temperature
IEC 60068-2-30:2005	Environmental testing – Part 2-30: Tests – Test Db:Damp heat, cyclic (12 h + 12 h cycle)
CEA Technical Standards for Connectivity to the Grid Regulations 2007 with 2013 and 2019 Amendment	
As per the Solar Photovoltaics, Systems, Devices and Components Goods (Requirements for Compulsory Registration) Order, 2017, Inverters used in the grid connected solar power projects shall be registered with BIS and bear the Standard Mark as notified by the Bureau of Indian Standards.	

4.2 SUPPLIER QUALIFICATION CRITERIA

The Inverter Supplier shall be Class-I local supplier as per MNRE Order on Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content) in respect of Renewable Energy (RE) Sector dated 9th February, 2021 and subsequent amendments.

4.3 TECHNICAL REQUIREMENTS

Parameter	**Specification**
Rated AC power	As per design
Maximum input voltage	1500 V
Rated AC output voltage	As per design
Tolerance on rated AC output voltage	+/-10%
Rated frequency	50 Hz
Operating frequency range	47.5 Hz to 52 Hz
Power factor control range	0.9 lag to 0.9 lead
European efficiency	Minimum 98%
Maximum loss in Sleep Mode	0.05% of rated AC power
Total Harmonic Distortion	Less than 3% at 100% load
Degree of protection	Central Inverter –IP 65 (Outdoor), String Inverter – IP 65

4.3.1 The rated/ name plate AC capacity of the PCU shall be AC power output of the PCU at 50°C.

4.3.2 Maximum power point tracker (MPPT) shall be integrated in the PCU to maximize energy drawn from the Solar PV array. The MPPT voltage window shall be sufficient enough to accommodate the output voltage of the PV array at extreme temperatures prevailing at site.

4.3.3 The PCU output shall always follow the grid in terms of voltage and frequency. The operating voltage and frequency range of the PCU shall be sufficient enough to accommodate the allowable grid voltage and frequency variations.

4.4 CONSTRUCTION

4.4.1 Power Conditioning Unit (PCU) shall consist of an electronic three phase inverter along with associated control, protection, filtering, measurement and data logging devices.

4.4.2 Every DC input terminal of PCU shall be provided with fuse / MCB / MCCB of appropriate rating. The combined DC feeder shall have suitably rated isolators for safe start up and shut down of the system. One spare DC input terminal shall be provided for each PCU. String inverters without DC fuse may be acceptable in case not more than two strings are connected to the same MPPT.

4.4.3 Type-II surge protective device (SPD) conforming to IEC 61643-11 / IEC 61643-31 / EN 50539-11 shall be connected between positive/ negative bus and earth.

4.4.4 In case external auxiliary power supply is required, UPS shall be used to meet auxiliary power requirement of PCU. It shall have a backup storage capacity of 2 hours.

4.4.5 Circuit Breaker or Relay of appropriate voltage and current rating shall be provided at the output to isolate the PCU from grid in case of faults.

4.4.6 The PCU shall be tropicalized and the design shall be compatible with conditions prevailing at site. Suitable number of exhaust fan with proper ducting shall be provided for cooling keeping in mind the extreme climatic condition of the site as per the recommendations of OEM to achieve desired performance and life expectancy.

4.4.7 All the conducting parts of the PCU that are not intended to carry current shall be bonded together and connected to dedicated earth pits through protective conductor of appropriate size. DC negative terminal shall be grounded. In case DC negative grounding is not possible, appropriate anti-PID device shall be provided.

4.4.8 Dedicated communication interface shall be provided to monitor the PCU from SCADA.

4.4.9 PCU front panel shall be provided with LCD/ LED to display all the relevant

parameters related to PCU operation and fault conditions. It shall include, but not limited to, the following parameters.

i) DC input power
ii) DC input voltage
iii) DC input current (for each terminal)
iv) AC output power
v) AC output voltage (all the 3 phases and line)
vi) AC output current (all the 3 phases and line)
vii) Frequency
viii) Power Factor

In case of outdoor PCU, PCU without LCD display with provision for Data access over Bluetooth / WiFi shall be acceptable.

4.4.10 String inverter, if installed in open, shall be placed inside a canopy shed with at least 15 cm in all directions. Alternatively, the Contractor may install the inverter on the column post of the Module Mounting Structure, below the modules. In such case, the canopy is not required, and the column and foundation shall be designed accordingly.

4.4.11 AC combiner box for string inverter configuration shall comply with Clause 9 of the Technical Specifications with exception of the following.

i) Rated System Voltage – Inverter output voltage
ii) IP Rating – IP 55
iii) Metering System – Not required
iv) CBCT – Not applicable

4.5 OPERATING MODES

Operating modes of PCU shall include, but not limited to, the following modes. These operating modes and conditions for transition are indicative only. The Contractor shall provide the detailed flow chart indicating the various operating modes and conditions for transition during detailed engineering.

4.5.1 Standby Mode

The PCU shall continuously monitor the input DC voltage and remain on Standby Mode until it reaches the pre-set value.

4.5.2 MPPT Mode

When the input DC voltage is above the pre-set value and AC grid connection conditions are fulfilled, the PCU shall enter into MPPT mode.

4.5.3 Sleep Mode

When the AC output power/DC input voltage decreases below the pre-set value for pre-set time delay, the PCU shall switch into Sleep Mode.

4.6 POTECTION FEATURES

The PCU shall include appropriate self-protective and self-diagnostic feature to protect itself and the PV array from damage in the event of PCU component failure or from parameters beyond the PCU's safe operating range due to internal or external causes.The self-protective features shall not allow signals from the PCU front panel to cause the PCU to be operated in a manner which may be unsafe or damaging. Faults due to malfunctioning within the PCU, including commutation failure, shall be cleared by the PCU protective devices.

The PCU shall provide protection against the following type of faults, among others.

i) DC/AC over current
ii) DC/AC over voltage
iii) DC reverse polarity
iv) DC earth fault
v) AC under voltage
vi) AC under frequency/over frequency
vii) Islanding
viii) Over temperature
ix) Lightning surges

4.7 GRID SUPPORT FUNCTIONS

4.7.1 Active power regulation

The PCU shall be able to limit the active power exported to the grid based on the setpoint provided through PCU front control panel. The PCU shall also be able to automatically the limit the active power after an increase in grid frequency above a pre-set value. The ramp rate shall be adjustable during operation and start-up after fault. The applicability of the requirement shall be as per CEA regulation andcompliance.

4.7.2 Reactive power control

The PCU shall be able to inject /absorb reactive power to/ from the grid based on the set point provided through PCU front control panel. The same shall be performed automatically with adjustable ramp rate based on dynamic changes in grid voltage or reactive power reference.

4.7.3 Voltage Ride Through

The PCU shall remain connected to the grid during temporary dip or rise in grid voltage as per the LVRT and HVRT requirements of CEA Technical Standards for Connectivity to the Grid Regulations. The PCU shall also be able to inject reactive power during the period of voltage dip.

4.8 WARRANTY

The complete Power Conditioning Unit shall be warranted against all material / manufacturing defects and workmanship for minimum of 5 (five) years from the date of operational acceptance.

4.9 TESTS

4.9.1 TYPE TESTS

The type test certificates as per the standards mentioned above should be from any of the NABL/ILAC/IECEE member signatory accredited test centres. Laboratory accreditation certificate or weblink along with scope of accreditation shall also be submitted. It is the responsibility of the Contractor to substantiate

the compliance forCEA Regulations using test reports.

4.9.2 ROUTINE TESTS

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP) approved by the Purchaser.

5. INVERTER TRANSFORMER AND AUXILIARY TRANSFORMER

5.1 STANDARDS AND CODES

Inverter transformer and auxiliary transformer, wherever applicable, shall comply with the latest edition of the following standards and codes including amendments.

In order to have reliability of Solar System at Bhiwani site minimum Two (2) no's of Inverter transformer (IDT) should be offered.

Standard	**Description**
IS 2026, IEC 60076	Specification of Power Transformers
IS 11171, IEC 60076	Dry-Type Power Transformers
IS 2099, IEC 60137	Bushings for alternate voltage above 1000 V
IS 335, IEC 60296	Insulating oil
IS 3639	Fittings and Accessories for Power Transformers
IS 12063	Degree of protection provided by enclosures
CBIP publication no. 315	
Indian Electricity rules and other statutory regulations	

5.2 TECHNICAL REQUIREMENTS

Parameters	**Inverter Transformer**	**Auxiliary Transformer**
VA Rating	As per system design	
Voltage Ratio	1. 11KV Output Inverter	As per system design

	Transformer voltage for Bhiwani. Power evacuation shall be at 132KV. 2. 33kV or as per design Output Inverter Transformer voltage for Hisar. Power evacuation shall be at 33KV (Input as per system requirement)	
Duty, Service & Application	Continuous Solar Inverter application and converter duty (Outdoor)	Continuous application(Outdoor)
Winding	As per system design.	2
Frequency	50 Hz	50Hz
Nos. of Phase	3	3
Vector Group & Neutral earthing	As per system/inverter manufacturer requirement	Dyn11 (as per system design)
Cooling	ONAN	ONAN / AN
Tap Changer	OCTC, No. of steps shall be as per system requirement	
Impedance at 75°C	As per Inverter Manufacturer requirement	As per system requirement
Permissible Temperature rise over an ambient of 50°C (irrespective of tap)		
Top Oil	50°C	As per IS/IEC
Winding	55°C	As per IS/IEC
SC withstand time(thermal)	2 second	2 second
Short Circuit Apparent power	As per system requirement	
Termination	As per system requirement	

Bushing rating, Insulation class (Winding & bushing)	1. 12kV HV side for Bhiwani. 2. 36kV or as per design HV side for Hisar. 3. 1.1kV epoxy bushing for Bhiwani & Hisar (as per system requirement on the LV side). or (As per system requirement)
Noise level	As per NEMA TR-1
Loading Capability	Continuous operation at rated MVA on any tap with voltage variation of +/-3%, also transformer shall be capable of beingloaded in accordance with IEC 60076-7
Flux density	Not to exceed 1.9 Wb/sq.m. at any tap position with combined frequency and voltage variation from rated V/f ratio by 10% corresponding to the tap. Transformer shall also withstand following over fluxing conditions due to combined voltage andfrequency fluctuations: a) 110% for continuous rating b) 125% for at least one minute c) 140% for at least five seconds. Bidder shall furnish overfluxing characteristic up to 150%
Air Clearance	As per CBIP

5.3 CONSTRUCTION

5.3.1 The transformer shall be provided with conventional single compartment conservator with prismatic toughened glass oil gauge. The top of the conservator shall be connected to the atmosphere through indicating type cobalt free silica gel breather with transparent enclosure. Silica gel shall be isolated from atmosphere by an oil seal. Inverter transformers shall be provided with Magnetic Oil Gauge (MOG) with low oil level alarm contact.

5.3.2 It is the responsibility of the Contractor to ensure that the inverter transformer comply with all the requirements of inverter provided by the inverter manufacturer.

5.3.3 Inverter Transformer shall be designed to suppress harmonics especially 3rd & 5th and for at least 5% total harmonic distortion (THD) to withstand distortion generated by the inverter as well as possible outside harmonics from the network.

5.3.4 The transformer shall be suitable for continuous operation with a frequency variation of ± 3% from nominal frequency of 50Hz without exceeding the specified temperature rise.

5.3.5 Inverter Transformer shall have shield winding between LV & HV windings. Each LV winding must be capable of handling non-sinusoidal voltage with voltage gradient as specified by the inverter manufacturer. Also, shield winding shall be taken out from tank through shield bushing and the same shall be brought down to the bottom of the tank using copper flat and support insulator for independent grounding. Shied bushing shall be rated for 1.1kV.

5.3.6 Neutral bushing of Inverter duty transformer shall be brought outside the tank for the testing purpose. It shall be covered with MS sheet and a sticker “For testing purpose only. Do not earth”. Neutral bushing of auxiliary transformer shall be brought outside the tank for earthing.

5.3.7 Transformer shall have 150 mm dial type Oil Temperature Indicator (OTI) and Winding Temperature Indicator (WTI) with alarm and trip contacts. All indicators shall have accuracy of 1.5%. For inverter transformers, WTI shall be provided for all the windings.

5.3.8 The radiators shall be detachable type, mounted on the tank with shut off valve at each point of connection to the tank, lifts, along with drain plug/ valve at the bottom and air release plug at the top.

5.3.9 Marshalling Box shall be of sheet steel, dust and vermin proof provided with proper lighting and thermostatically controlled space heaters. The degree of protection shall be IP 55. Marshalling Box of all transformers shall be preferably Tank Mounted. One dummy terminal block in between each trip wire terminal shall be provided. At least 10% spare terminals shall be provided on each panel. The gasket used shall be of neoprene rubber. Wiring scheme (TB details) shall be engraved in a stainless-steel plate with viewable font size and the same shall be fixed inside the Marshalling Box door.

5.3.10 Buchholz relay, double float type with alarm and trip contacts, along with suitable gas & oil collecting arrangement shall be provided.

5.3.11 Inverter transformer shall be provided with spring operated Pressure Relief Device (with trip contacts) with suitable discharge arrangement for oil. For Auxiliary transformers, diaphragm type explosion vent shall be provided.

5.3.12 Filter valve at top the tank and drain cum sampling valve at bottom of the tank shall be provided.

5.3.13 All external surface of the transformer shall be painted with grey color (shade 631 of IS-5). The painting shall be according to C5 (High) corrosive category as per ISO 12944-5. Internal surface of cable boxes and marshalling box shall be painted with epoxy enamel white paint. The minimum dry film thickness (DFT) shall be 100 microns.

5.3.14 LV and HV cable box shall be provided with disconnecting chamber to facilitate the movement of transformer without disturbing cable box and termination.

5.3.15 Air release plug, bi-directional wheel/skids, cover lifting eyes, transformer lifting lugs, jacking pads, towing holes, core and winding lifting lugs, inspection cover, rating plate, valve schedule plate, accessories and terminal marking plates, two nos. of earthing terminals shall be provided.

5.3.16 Rain hoods to be provided on Buchholz, Magnetic oil Gauge (MOG) & Pressure relief Device (PRD). Entry points of wires shall be suitably sealed.

5.3.17 The accessories listed above are indicative only. Accessories which are not mentioned above but required for satisfactory operation of the transformers are deemed to be included in the contract without extra charges.

5.3.18 Fire-protection for inverter transformer shall be provided in accordance with relevant CEA regulations as amended time to time.

5.4 DRY TYPE AUXILIARY TRANSFORMER

5.4.1 Transformer shall be cast resin encapsulated dry type transformer, made of cold rolled grain-oriented silicon steel laminations of M4 grade or better. Winding conductor shall be electrolytic grade Copper and insulation shall be

ClassF or better.

5.4.2 The transformers shall be housed in a metal protective housing, having a degree of protection of IP 65 suitable for outdoor installation IP 54 suitable for indoor installation. The enclosure shall be provided with suitable hardware and accessories required for satisfactory operation of the transformer as per the relevant standard.

5.5 Warranty

The transformer shall be warranted against all material/ manufacturing defects and workmanship for minimum of 60 months from the date of operational acceptance or 66 months from the date of dispatch whichever period may expire earlier against all material/ manufacturing defects and workmanship.

5.6 Testing and Inspection

5.6.1 Type Tests and Special Tests

The following type test and special test reports shall be submitted during detailed engineering. The tests should have been conducted on the similar transformer by NABL accredited laboratory within last ten years reckoned from the date of issue of NIT.

5.6.1.1 Type Tests

i) Lightning impulse (Full & Chopped Wave) test on windings as per IS 2026-3 / IEC 60076-3

ii) Temperature Rise test at a tap corresponding to maximum losses as per IS 2026-2 / IEC 60076-2

5.6.1.2 Special Tests

i) Measurement of zero-sequence impedance as per IS 2026-1 / IEC 60076-1

ii) Measurement of harmonics of no-load current as per IS 2026-1 / IEC 60076-1

iii) Measurement of acoustic noise level as per NEMA TR-1

iv) Short-circuit withstand test as per IS 2026-5 / IEC 60076-5

In case the contractor is not able to submit the test reports during detailed engineering, the contractor shall submit the reports of type/special tests either conducted by NABL accredited laboratory or witnessed by Purchaser. However, for short circuit withstand test he may furnish the calculations for thermal and dynamic withstand capacity of the offered transformer as per his design to validate ability of transformer to withstand the short circuit.

5.6.1.3 Type and Special tests are not required for auxiliary transformers of rating including 100 kVA and below. However, auxiliary transformer shall conform to IS 1180 (with latest amendments) and must have BEE rating as per BIS guidelines.

5.6.2 Routine Tests

Each completed transformer shall be subjected to following routine tests as per the latest edition of IEC 60076 unless specified otherwise.

i) Measurement of winding resistance at each tap
ii) Measurement of voltage ratio between HV and LV windings at each tap
iii) Check of vector group
iv) Measurement of no-load loss and no-load current
v) Measurement of short-circuit impedance and load loss
vi) Magnetic balance test as per CBIP manual publication no. 295
vii) Separate source voltage withstand test
viii) Induced over voltage withstand test
ix) Measurement of insulation resistance
x) Marshalling box functional test
xi) IR Measurement on wiring of marshalling box
xii) Breakdown voltage test on transformer oil as per IS 335
xiii) Oil leakage test on completely assembled transformer along with radiators.

5.6.3 TESTS AT SITE

After erection at site all transformer(s) shall be subjected to the following tests.

i) Measurement of voltage ratio

ii) Check of vector group

iii) Magnetic balance test

iv) Measurement of insulation resistance

v) Breakdown voltage test on transformer oil

In case the equipment is not found as per the requirements of the Technical Specifications of NIT, all expenses incurred during site testing will be to the Contractor's account and the equipment shall be replaced by him at free of cost.

6. HT SWITCHGEAR

HT Switchgear shall be out door type. **Operatable both from local site as well as from Control Room through SCADA**.

6.1 STANDARDS AND CODES

All equipment provided under HT switchgear shall comply with latest editions and amendments of the relevant IEC standards and IS codes. In particular, the switchgear shall comply with the following standards and codes.

Standard/Code	**Description**
IS/IEC 62271-1	High Voltage Switchgear and Control gear – Part 1: CommonSpecifications
IS/IEC 62271-100	High Voltage Switchgear and Control gear – Part 100: ACCircuit Breakers
IS/IEC 62271-102	High Voltage Switchgear and Control gear – Part 102: ACDisconnectors and Earthing Switches
IS/IEC 62271-200	High Voltage Switchgear and Control gear – Part 200: ACMetal Enclosed Switchgear and Control gear for Rated Voltages Above 1 kV and Up to and Including 52 kV
IEC 61869	Instrument Transformers

IS 3231	Electrical relays for power systems protection
IEC 60255	Measuring relays and protection equipment
IEC 61850	Communication networks and systems for power utility automation
IEC 61131-3	Programmable controllers – Part 3: Programming languages
IS 9385	High voltage fuses
IS 9431	Indoor post insulators of organic material for systems with nominal voltages greater than 1000 V up to and including 300kV
IEC 60099-4	Surge arresters – Part 4: Metal-oxide surge arresters withoutgaps for A.C. systems
IS 3070-3	Lightning Arresters for Alternating Current Systems – Part 3:Metal Oxide Lightning Arresters Without Gaps
IEC 62052-11	Electricity metering equipment (A.C.) – General requirements,tests and test conditions – Part 11: Metering equipment
IEC 62053	Electricity metering equipment (A.C.) – Particular requirements
IS 14697	AC Static Transformer Operated Watthour and Var-hourMeters, Class 0.2S and 0.5S

6.2 TECHNICAL PARAMETERS

Parameter	**Specification**
System Parameters	
Highest system voltage	36kV (Hisar) & 12kV (Bhiwani) As per system requirement
Rated system voltage	33kV (Hisar) & 11kV (Bhiwani) As per system requirement
Rated frequency	50 Hz

Number of phases	3
Power frequency withstand voltage	70 kV (r.m.s.) (Hisar) & 28kV (r.m.s.) (Bhiwani) As per system requirement
Lightning impulse withstand voltage	175 kVp (Hisar) & 75 kVp (Bhiwani) As per system requirement
System fault current	As per system requirement
Internal Arc Classification Rating	IAC-A, FLR, System Fault Current for 3 s
Circuit Breaker	
Type	Vacuum type
Operating duty cycle	O – 0.3 Sec – CO – 3 min – CO
Short circuit breaking current	As per system requirement
Short circuit making current	2.5 times S.C. breaking current
Re-strike performance class	C2
Mechanical endurance class	M2
Current Transformer	
Accuracy class	0.2 for metering (0.2S for metering at outgoing feeder), 5P20 for protection
Rated VA burden	As per requirement
Insulation class	Class E or better
Voltage Transformer	
Accuracy class	0.2 for metering, 3P for protection
Rated VA burden	As per requirement
Insulation class	Class E or better

6.3 SWITCHGEAR PANEL (AS APPLICABLE, AS PER SYSTEM REQUIREMENT)

6.3.1 The switchgear panel shall be free standing, floor mounted, single front, single tier fully compartmentalized, metal enclosed construction. Each panel

shall have separate compartments for circuit breaker, bus bars, cable termination and auxiliary circuit.

6.3.2 The circuit breakers shall be mounted on horizontally with drawable trucks with locking facility in SERVICE and TEST positions.

6.3.3 The panel enclosure shall be constructed with CRCA steel/Aluzinc sheet. The thickness of load bearing members shall be minimum 3 mm and that of non-load bearing members shall be minimum 2 mm.

6.3.4 All surfaces shall be painted with colour gray-631. The painting shall be according to C5 (High) corrosive category as per ISO 12944-5 with minimum thickness of 100 microns.

6.3.5 The circuit breaker and auxiliary circuit compartments provided on the front side shall have separate concealed hinged doors. Cable and bus bar compartments provided on the rear side shall have separate bolted covers. All doors and covers shall be provided with neoprene/synthetic rubber gaskets to prevent entry of vermin and dust.

6.3.6 Pressure relief device shall be provided in each high voltage compartment of a panel to safely vent the gases in the event of internal arc. Seal-off bushing arrangement shall be provided between the breaker compartment and bus bar/cable compartments to prevent transfer of arc from one compartment to other.

6.3.7 Automatic safety shutters shall be provided to cover up the fixed high voltage contacts on bus bar and cable sides when the truck is moved to TEST position.

6.3.8 Degree of protection shall not be less than IP 5X for auxiliary circuit compartment. However, for remaining compartments it shall not be less than IP 4X. For outdoor panels, degree of protection shall not be less than IP 55.

6.3.9 Mechanical /Electrical interlocks shall be provided to prevent mal-operation and in particular to ensure the following.

i) The breaker shall be operated only if it is in SERVICE or TEST position.

ii) Movement of the breaker truck between SERVICE and TEST positions shall be possible only if the breaker is OFF.

iii) It shall be possible to open the door only when the breaker is in TEST position.

6.3.10 Panel shall be provided with local bus-bar protection

6.3.11 Each switchgear panel shall be provided with thermostatically controlled space heaters, separately for breaker, cable and bus bar compartments, to prevent condensation within the compartment. The space heater shall be connected to 240 V, 50 Hz, single phase AC supply through suitable switch and fuse.

6.3.12 240 V, 5 A, SPN industrial socket-outlet with ON/OFF switch shall be provided in each panel.

6.3.13 Each panel shall be provided with LED lamp rated for 240 V, 50 Hz, single phase AC supply for interior illumination controlled by door switch.

6.3.14 Gapless, metal-oxide surge arrestors shall be provided between line and earth in cable compartment of the switchgear panel.

6.3.15 Suitable lifting hooks shall be provided for each panel.

6.3.16 The space arrangements of the equipment's in the VCB panels shall be kept adequately. So that maintenance activities can be carried out easily.

6.4 CIRCUIT BREAKERS (AS APPLICABLE, AS PER SYSTEM REQUIREMENT)

6.4.1 Circuit breakers shall be of vacuum type. It shall comprise of three separate identical single pole units operated through the common shaft and shall be fullyinterchangeable both electrically and mechanically.

6.4.2 The circuit breaker operating mechanism shall be based on motor operated spring charging and it shall be re-strike free, trip free both electrically and mechanically, with anti-pumping feature.

6.4.3 The rated control voltage of the spring charging motor shall be 240 VAC. Closing coil of 220 volt DC shall operate at all values of voltages between 85% and 110% of rated voltage. Opening coil shall operate correctly under all operating conditions of the circuit breaker up to the rated breaking capacity and at all values of supply voltage between 70% and 110% of rated voltage.

6.4.4 The spring charging motor shall have adequate thermal rating such that continuous sequence of the closing and opening operations is possible as long as power supply is available to the motor. It shall also be possible to charge the spring manually and close the breaker in the event of failure of motor / control supply to motor. Operating handle shall be provided for charging the operating mechanism. After failure of control supply to the motor, one open-close-open operation shall be possible with the energy contained in the operating mechanism.

6.4.5 The motor rating shall be such that it requires not more than 30 seconds for full charging of the closing spring. Closing action of the circuit breaker shall compress the opening spring ready for tripping. When closing springs are discharged after closing the breaker, they shall be automatically charged for the next operation.

6.4.6 Mechanical indicators shall be provided to indicate OPEN/CLOSED positions of the circuit breaker and CHARGED/ DISCHARGED positions of the closing spring. An operation counter shall also be provided. These indicators and counter shall be visible from the panel front door without opening it.

6.5 NUMERICAL RELAYS

6.5.1 All relays shall be microprocessor based numerical type. However, auxiliary relays can be static or electromechanical type. The relays shall be flush mounted on panelfront with connections from the inside.

6.5.2 The relays shall be capable of operating continuously between 80 – 120% of auxiliary voltage

6.5.3 All numerical relays shall have adequate number of freely configurable, optically isolated, Binary Inputs (BI) and potential free Binary Outputs (BO).

6.5.4 All numerical relays shall have minimum four no. of current inputs, three for phase current and one for earth current, suitable for CT secondary current of 1A. The current inputs shall be compatible with both residual connected CT and Core Balance CT (CBCT). In addition, numerical relay in main outgoing feeder shall have three no. of voltage inputs for Under Voltage/Over Voltage

protection.

6.5.5 All I/O's shall have galvanic isolation. Analog inputs shall be protected against switching surges and harmonics.

6.5.6 Making, breaking and continuous capacity of the relay contacts shall be adequate enough for the circuits in which they are used.

6.5.7 The numerical relay shall have the following protection functions with at least two independent protection setting groups. The protection functions shall be selectable from any of the IEC characteristic curves.

i) Definite time (DT) phase over current protection
ii) Inverse Definite Minimum Time (IDMT) phase over current protection
iii) Definite time (DT) earth fault current protection
iv) Inverse Definite Minimum Time (IDMT) earth fault current protection
v) Under Voltage protection
vi) Over Voltage protection

6.5.8 Transformer feeder protection relay shall have provision for the following protection functions.

i) Buchholz alarm & trip
ii) Oil Temperature Indicator (OTI) alarm & trip
iii) Winding Temperature Indicator (WTI) alarm & trip
iv) Pressure Relief Valve (PRV) trip
v) Magnetic Oil Gauge (MOG) alarm

6.5.9 All numerical relays shall have provision for measurement and storage of electrical parameters such as voltage, current, frequency, active power, reactive power etc.

6.5.10 The numerical relay shall be able to record faults and events in non-volatile memory.

i) Fault record – At least 5 recent faults including the protection function operated, operating phase(s), voltages and currents along with date and time stamp.
ii) Event record – At least 200 events with date and time stamp.

6.5.11 The numerical relay shall have trip circuit supervision facility to monitor the circuit breaker trip circuit both in pre-trip and post-trip conditions. The relay shall also be able to provide circuit breaker monitoring, CT and VT supervision.

6.5.12 The numerical relay shall have self-diagnostic feature with separate output contact for indication of any internal relay failure.

6.5.13 The numerical relay shall have RS-232/RS-485/RJ-45/USB/Fibre optics ports on front side for local communication with PC and on rear side for remote communication to SCADA system.

6.5.14 The numerical relay shall have feature for time synchronization through the SCADA System / networking.

6.5.15 The numerical relay shall be provided with backlit alphanumeric LCD to access protection settings, measurement parameters, fault and event records. Read and write access to protection settings shall be password protected.

6.6 INSTRUMENT TRANSFORMERS

6.6.1 Instrument transformers shall be completely encapsulated cast resin type, suitable for continuous operation at the ambient temperature prevailing inside the switchgear enclosure , when the switchgear is operating at its rated load and the outside ambient temperature is 50°C.

6.6.2 Polarity marks shall indelibly be marked on each instrument transformer and at the lead terminals at the associated terminal block.

6.6.3 Voltage transformers shall be single phase units. Bus voltage transformers shall be housed in a separate panel on withdrawable truck.

6.6.4 HRC fuses of suitable rating shall be provided on primary side of voltage transformers. For secondary side, four pole Miniature Circuit Breakers (MCB) shall be provided with its supervision facility.

6.7 EARTHING

6.7.1 An earth bus made of copper shall be provided throughout the length of the

panel. It shall be bolted to the framework of each panel and brazed to each breaker earthing contact bar.

6.7.2 The earth bus shall have sufficient cross section to carry maximum fault current without exceeding the allowable temperature rise.

6.7.3 All non-current carrying conductors of the panel shall be connected to the earth bus. All joints to the earth bus shall be made through at least two bolts. Hinged doors shall be earthed through flexible earthing braid of adequate cross section. Suitable provision shall be provided at each end of the earth bus for connection with BBMB earth conductor.

6.7.4 Positive earthing of the breaker truck and frame shall be maintained when it is in the connected position and in all other positions whilst the auxiliary circuits are not totally disconnected.

6.7.5 All metallic cases of relays, instruments and other panel mounted equipment shall be connected to earth bus by independent copper wires of size not less than 2.5 sq. mm with green colour insulation.

6.7.6 Instrument transformer secondary neutral point shall be earthed at one place only on the terminal block. Such earthing shall be made through links so that earthing of one circuit may be removed without disturbing the earthing of other circuits.

6.7.7 Separate earthing trucks shall be provided for earthing of busbars and incoming/outgoing feeders. The trucks shall have voltage transformer to indicate presence of voltage prior to earthing. An audible alarm shall also be provided in case of voltage on the earthing terminal. Integral earth switches may also be considered instead of earthing trucks. The earthing truck/switch shall have short circuit withstand capability equal to that of the associated switchgear panel.

6.7.8 The interlocks shall be provided to ensure the following.

i) It is not possible to rack-in the earthing truck/close the earthing switch when the breaker truck is in SERVICE position.

ii) It is not possible to rack-in the breaker truck into SERVICE position when earthing truck is connected/earthing switch is in closed position.

6.8 BUS BAR

6.8.1 Bus bar shall be made of copper with uniform cross section throughout their length. They shall be adequately supported on insulators to withstand electricaland mechanical stresses due to specified short circuit current.

6.8.2 All bus bars joints shall be thoroughly cleaned and anti-oxide grease shall be applied. Plain and spring washers shall be provided to ensure good contacts at the joints and taps. Wherever aluminium to copper connections are required, suitable bimetallic connectors or clamps shall be used.

6.8.3 Bus bars shall be provided with heat shrinkable sleeves of suitable insulation class throughout their length with proper colour coding. All bus bar joints and taps shall be shrouded.

6.8.4 Bus bar support insulators shall be made of non-hygroscopic, arc and track resistant, high strength material suitable to withstand stresses due to over voltage and short circuit current.

6.8.5 The Contractor shall submit busbar sizing calculation for specified continuous and short time current ratings during detailed engineering.

6.9 MEASURING INSTRUMENTS

6.9.1 All the measuring instruments shall be digital, flush mounting type with communication facility.

6.9.2 All feeders except main outgoing feeder shall be provided with digital Multi-Function Meter (MFM). Tri Vector Meter (TVM) shall be provided for the main outgoing feeder (in the HT Panel). Accuracy class of MFM shall be 0.2 and that of TVM shall be 0.2S.

6.9.3 Measuring instruments shall have provision to display the following parameters.

i) Line and phase voltages

ii) Line and phase currents

iii) Active power, Reactive power, Apparent power

iv) Frequency

v) Power factor

vi) Total Harmonic Distortion (THD)

6.10 WIRING AND TERMINAL BLOCKS

6.10.1 All internal wiring shall be done with 650 V grade, 1.5 sq.mm. PVC insulated stranded flexible copper wire. For CT secondary circuits, 2.5 sq.mm copper wire shall be used.

6.10.2 Wire terminations shall be made with solderless crimping type tinned copper lugs, which shall firmly grip the conductor. Insulation sleeves shall be provided at all the wire terminations.

6.10.3 Printed identification ferrules, marked to correspond with panel wiring diagram shall be provided at both ends of each wire. The ferrules shall be firmly located on each wire so that they cannot move or turn freely on the wire. Wire identification shall be done in accordance with IS 11353.

6.10.4 The Contractor shall be solely responsible for the completeness and correctness of the internal wiring and for the proper functioning of the connected equipment.

6.10.5 All internal wiring to be connected to the external equipment shall terminate on terminal blocks. Terminal blocks shall be rated for 650 V, 10 A and made of non- inflammable material.

6.10.6 CT and VT secondary circuits shall be terminated on stud type, non-disconnecting terminal blocks.

6.10.7 At least 10% spare terminals shall be provided on each panel and these spare terminals shall be distributed on all terminal blocks.

6.11 WARRANTY

The complete switchgear equipment's like Circuit Breakers, CT's, PT's, LA's, Isolators, Relays, Switchgear panels etc. shall be warranted for minimum of 2 years from the date of operational acceptance.

6.12 TESTING AND INSPECTION

6.12.1 TYPE TESTS

The switchgear panel shall be of type tested design. The following type test reports shall be submitted during detailed engineering. The tests should have been conducted on the similar equipment by NABL accredited laboratory.

Test	**Standard**	**Relevant IEC Clause**
Switchgear Panel		
Dielectric tests		
Power frequency voltage test	IEC 62271-200	6.2.6.1
Lightning impulse voltage test	IEC 62271-200	6.2.6.2
Dielectric tests on auxiliary and control circuits	IEC 62271-200	6.2.10
Measurement of the resistance of the main circuit	IEC 62271-200	6.4.1
Temperature-rise tests	IEC 62271-200	6.5
Short-time withstand current and peakwithstand current tests	IEC 62271-200	6.6
Verification of the IP coding	IEC 62271-200	6.7.1
Verification of making and breaking capacities	IEC 62271-200	6.101
Mechanical operation test	IEC 62271-200	6.102
Internal arc test	IEC 62271-200	6.106
Circuit Breaker		
Mechanical operation test at ambient airtemperature (M2 Class)	IEC 62271-100	6.101.2

Basic short-circuit test-duties	IEC 62271-100	6.106
Relays		
Vibration tests	IEC 60255-21-1	
Shock and bump tests	IEC 60255-21-2	
Seismic tests	IEC 60255-21-3	
Electromagnetic compatibility requirements	IEC 60255-26	
Product safety requirements	IEC 60255-27	
Common requirements	IEC 60255-1	
Functional requirements	Relevant parts of IEC 60255-100 series	
Communication requirements	IEC 61850	
Current Transformers		
Temperature-rise test	IEC 61869-2	7.2.2
Impulse voltage withstand test onprimary terminals	IEC 61869-2	7.2.3
Tests for accuracy	IEC 61869-2	7.2.6
Short-time current tests	IEC 61869-2	7.2.201
Voltage Transformer		
Temperature-rise test	IEC 61869-3	7.2.2
Impulse voltage withstand test onprimary terminals	IEC 61869-3	7.2.3
Test for accuracy	IEC 61869-3	7.2.6
Short-circuit withstand capability test	IEC 61869-3	7.2.301

In case the contractor is not able to submit the test reports during detailed engineering, the contractor shall submit the reports of type/special tests either conducted by NABL accredited laboratory or witnessed by Purchaser.

6.12.2 ROUTINE TESTS

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP)approved by the Purchaser.

7. AC CABLES

7.1 STANDARDS AND CODES

All AC Cables shall conform to the following standards and codes.

IS 7098	Crosslinked Polyethylene Insulated Thermoplastic Sheathed Cables,Part 1: For working voltage up to and including 1100 V
IS 7098	Crosslinked Polyethylene Insulated Thermoplastic Sheathed CablesPart 2: For working voltages from 3.3 kV up to and including 33 kV

7.2 All AC cables shall be flame retardant low smoke (FRLS) type designed to withstand all mechanical, electrical and thermal stresses develop under steady state and transient operating conditions.

7.3 Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted. However, cable joints may be allowed if the route length is more than maximum available drum length subject to Purchaser's approval.

7.4 In addition to manufacturer's identification on cables as per relevant standard, followingmarking shall also be provided over outer sheath.

i) Cable size and voltage grade

ii) Word 'FRLS' at every meter

iii) Sequential marking of length of the cable in meters at every meter

7.5 Cables shall be sized based on the following considerations:

i) Rated current the equipment

ii) In case of Central inverters, maximum voltage drop in LT cable (from PCU to inverter transformer) shall be limited to 0.5% of the rated voltage. In case of String inverters, maximum voltage drop (from string inverter to LT combiner panel and from LT combiner panel to Inverter duty transformer) shall be limited to 1.5%. For HT cables (from inverter transformer to plant take off point), maximum voltage drop shall be limited to 0.5 % of the rated voltage. The Contactor shall provide voltage drop calculations in excel sheet.

iii) Short circuit withstand capability as per design for 1s.

iv) De-rating factors according to laying pattern

7.6 WARRANTY

All cables shall be warranted against all material/ manufacturing defects and workmanship for minimum of 12 (Twelve) months from the date of operational acceptance i.e. up to defect liability Period.

7.7 TESTING

Type, routine and acceptance tests requirements shall be as per relevant standardsfor all cable sizes.

7.8 INSTALLATION

7.8.1 Cable installation shall be as per IS 1255.

7.8.2 All AC Cables shall be laid along overground cable trays with cable cleats/ties ensuring minimum clearance of 500 mm above FGL. Cable trays shall be as per Clause 3.8.8 of Technical Specifications.

7.8.3 Cable terminations shall be made with properly crimped lugs and passed through cable glands at the entry & exit point of the cubicles. Bimetallic lugs shall be used for connecting Cu bus bar and Al cables or vice-versa.

7.8.4 All AC cables shall be provided with punched/embossed aluminium tags. The marking shall be done with good quality letter and numbers of proper size so that thecables can be identified easily.

8. AUXILIARY SUPPLY SYSTEM

8.1 Scheme for Auxiliary supply system shall be submitted by contractor during detailed engineering for the approval by Purchaser.

8.2 It shall mainly comprise of auxiliary transformer, AC distribution board(s) (ACDB), Battery & battery charger system, emergency lighting network, Uninterrupted power supply (UPS), distribution cables and metering & protective devices.

8.3 Auxiliary system shall be provided with two independent sources for reliable auxiliary power supply.

8.4 Following consideration shall be taken into account while sizing the auxiliary transformer:

i) 20% future load margin

ii) 20% design margin

iii) Total connected load at 0.8 power factor

9. LT SWITCHGEAR

9.1 STANDARDS AND CODES

All equipment provided under LT switchgear shall comply with latest revisions and amendments of the relevant IEC standards and IS codes. In particular, the switchgear shall comply with the following standards and codes.

Standard/Code	Description
IEC 61439-1	Low-voltage switchgear and control gear assemblies - Part 1:General rules
IEC 61439-2	Low-voltage switchgear and control gear assemblies - Part 2:Power switchgear and control gear assemblies
IEC 60947-1	Low-voltage switchgear and control gear - Part 1: General rules
IEC 60947-2	Low-Voltage Switchgear and Control gear: Circuit Breakers
IEC 60947-3	Low voltage switchgear and control gear: Part 3 Switches, disconnectors, switch-disconnectors and fuse combination units

IEC 60947-4-1	Low-voltage switchgear and control gear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters
IEC 60947-5-1	Low-voltage switchgear and control gear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices
IEC 62052-11	Electricity metering equipment (a.c.) - General requirements, tests and test conditions - Part 11: Metering equipment
IS 694	Polyvinyl chloride insulated unsheathed-and sheathed cables/ cords with rigid and flexible conductor for rated voltages - up to and including 450/750V
IEC 61869	Instrument Transformers
IS 3043	Code of practice for earthing
IEC 60255	Measuring relays and protection equipment - Part 1: Common requirements

9.2 TECHNICAL PARAMETERS

System Details	
Rated system voltage	415 V ± 10%, 3 Phase, 50Hz, 4 wire, NeutralSolidly Earthed
Digital Multifunctional Meter (MFM)	
Accuracy class	0.5 class for main distribution board at main control room and 0.5 class for DB at inverterroom(s)
Communication with SCADA	RS485 communication with Modbus RTU
Current transformer (CT)	
Type	Cast Resin Bar Primary
Voltage class and frequency	650 V, 50 Hz
CT Secondary Current	1 or 5 A

Class of insulation	Class F
Accuracy class & burden	
a) For Protection	5P20, 5VA PS Class for REF and core balance CT (CBCT)
b) For Metering	Class 0.5, 5VA (min)
Minimum primary earth fault current to be detected by CBCT	1 A
Instrument Security Factor for metering CT	5
Voltage transformer (VT)	
Type	Cast Resin
Accuracy class	0.5
Rated Voltage factor	1.1 continuous, 1.5 for 30 seconds
Class of insulation	E or better
Moulded case circuit breaker (MCCB)	
Rated voltage	415V
Release	Thermal-Magnetic/Microprocessor
Rated current	As per system requirement
Poles	4 poles
Rated insulation level	690V
Rated ultimate and service short circuit breaking Capacity	As per system requirement
Rated Making capacity (as per system requirement)	2.1 x Short circuit breaking capacity
Utilization category	A

9.3 CONSTRUCTIONAL DETAILS

9.3.1 The panel shall be metal enclosed, free standing, floor mounted, modular type with compartmentalized construction having degree of protection of IP 5X (Indoor) and IP 55 (Outdoor) as per IS/IEC 60529. All doors and covers

shall be provided with neoprene gaskets to prevent entry of vermin and dust.

9.3.2 All switches, push buttons etc. shall be operated front and shall be flush/semi-flush mounted.

9.3.3 The panel shall be fabricated from 2 mm CRCA sheet steel for frame & load bearing surfaces. Partitions may be fabricated from 1.6 mm CRCA if no components are mounted on them.

9.3.4 Cable entries shall be from bottom. The opening of cable entry shall be covered by 3mm thick gland plates with proper sealing to avoid water and rodent entry.

9.3.5 Earthing bus bar of suitable cross section shall be provided throughout the length of panel.

9.3.6 The panel shall be duly wired with suitable size of 1.1 kV, PVC insulated cable and terminals shall be brought out for cable connections. 10% spare terminals subjected to minimum one of each rating shall be provided on each distribution switchgear. All wire shall have ferrules as per wiring diagram.

9.3.7 Indoor panels shall be painted with 2 coats of primer after pre-treatment and 2 coats of Polyurethane / epoxy paint with shade as decided by the Purchaser. The minimum dry film thickness (DFT) shall be 50 microns. Outdoor panels shall be painted according to C5 (High) corrosive category as per ISO 12944-5.

9.3.8 The panel shall be of dead front construction suitable for front operated and back maintained functioning.

9.3.9 240 V, 5 A, 3 pin industrial socket-outlet with ON/OFF switch shall be provided In each panel.

9.3.10 Each panel shall be provided with LED lamp rated for 240 V, 50 Hz, single phase AC supply for interior illumination controlled by door switch.

9.3.11 Suitable lifting hooks shall be provided for each panel.

9.3.12 Each switchgear panel shall be provided with thermostatically controlled space heaters to prevent condensation within the enclosure. The space heater shall be connected to 240 V, 50 Hz, single phase AC supply through

suitable switch and fuse.

9.3.13 Earth leakage relay with Core balance CTs (CBCT) shall be provided on main incoming feeders having phase CT ratio more than 50/1A. CBCT's shall be circular window type with window size based on the overall diameter of the cables, to be finalized during detailed engineering.

9.4 WARRANTY

Distribution panels (ACDB and DCDB) shall be warranted against all material/ manufacturing defects and workmanship for minimum of 12 (Twelve) months from the date of operational acceptance i.e. up to defect liability Period.

9.5 TESTING

Routine test and acceptance tests requirements shall be as per relevant standards for all cable sizes.

10. UNINTERRUPTED POWER SUPPLY

10.1 STANDARDS AND CODES

Standard/Code	Description
IEC 62040-1	Uninterruptible power systems (UPS) – Part 1: General andsafety requirements for UPS
IEC 62040-2	Uninterruptible power systems (UPS) – Part 2: Electromagneticcompatibility (EMC) requirements
IEC 62040-3	Uninterruptible power systems (UPS) – Part 3: Method ofspecifying the performance and test requirements

10.2 GENERAL REQUIREMENTS

10.2.1 The Uninterrupted Power Supply (UPS) system shall be designed to supply power tofollowing loads (but not limited to).

i) Data logger / SCADA

ii) Fire Detection/ Alarm Panel
iii) HMI of SCADA
iv) Emergency Lighting
v) Inverter's Auxiliary supply (if applicable)
vi) HT panel auxiliary
vii) CCTV

10.2.2 Sizing of UPS shall be done considering the above-mentioned load at power factor of 0.8 lagging inclusive of 10% design margin at 50 ˚C.

10.3 SYSTEM DESCRIPTION

10.3.1 The UPS shall automatically provide continuous, regulated AC power to critical loads under normal and abnormal conditions, including loss of input AC power. The UPS system shall consist of the following major equipment.

i) UPS Module
   a) Insulated Gate Bipolar Transistor (IGBT) Converter
   b) Insulated Gate Bipolar Transistor (IGBT) Inverter
   c) Digital Signal Processor (DSP) using Pulse Width Modulation (PWM) for Direct Digital Control (DDC) of all UPS control and monitoring functions Static bypass switch.
ii) Battery system for 2 hours
iii) Battery protective and disconnect device
iv) Maintenance bypass switch
v) LCD display panel and LED indications
vi) Integrated UPS Communications Protocols capable of communicating with SCADA system.

10.3.2 The UPS shall meet the following minimum specifications.

Parameter	**Specification**
Topology	Online double conversion UPS
Input	

Voltage	230 V ± 10% AC
Frequency	50 ± 5 Hz
Power factor	0.95
Output	
Voltage	230V ± 1% AC
Frequency	50 Hz
Power factor	0.8
Battery	
Type	Sealed, Maintenance-Free (AGM) battery
Capacity	100% UPS load for 2 hours
Monitoring and communication	
LED Indicators	Load on Inverter, Battery operation, Load on Bypass,Overload, LCD Fault, UPS Fault
Electrical contacts	Closing contacts for each of the following conditions: 1. Unit on Battery 2. Low Battery 3. Summary Alarm 4. UPS On 5. Input Fail
Local Display	LCD/ LED
SCADA communications	RS-485 Interface Port
Overall efficiency	>90%
Electrical Protection	Input/ output under voltage, over temperature, overload,Short circuit, battery low trip

10.3.3 The UPS shall be forced air cooled by internally mounted fans. The fans shall be redundant in nature to ensure maximum reliability. The fans shall be easily replaceable without the use of special tools.

10.3.4 Contractor shall provide the Operation & Maintenance Manual and mandatory spare parts list along with the equipment.

10.4 WARRANTY

UPS and batteries shall be warranted for minimum of 12 (Twelve) months from the date of operational acceptance i.e. up to defect liability Period.

10.5 TESTS

10.5.1 Routine tests and acceptance tests on final product shall be done as per QAP approved by the Purchaser.

10.5.2 On completion of installation and commissioning of the equipment on site tests shall be carried out with the max. available load, which does not exceed the rated continuous load. An on-site test procedure shall be submitted by contractor include a check of controls and indicators after installation of the equipment.

11. BATTERY AND BATTERY CHARGER

11.1 STANDARDS AND CODES

Standard/Code	Description
IEC 60896-22:2004	Stationary lead-acid batteries – Part 22: Valve regulatedtypes – Requirements
IEC 60896-21:2004	Stationary lead-acid batteries – Part 21: Valve regulatedtypes – Methods of test
IS 1652	Specification for stationary cells and batteries, lead acidtype (with plante positive plates)
IS 8320	General requirements and methods of tests for lead acid storage batteries.
IS 15549	Stationary Regulated Lead Acid Batteries

11.2 GENERAL

110 V / 220 V DC system (Battery, Battery Charger & DCDB) (as per system requirement) in accordance with thisspecification and standards stated herein, shall comprise of the following.

i) Sealed Maintenance Free (VRLA) Battery complete with racks & accessories.
ii) One No. Float charger.
iii) One No. Float cum Boost charger.
iv) DC Distribution Board (DCDB)

11.3 BATTERY

11.3.1 Battery shall be used to supply the following loads with back up of two hours in caseof complete power failure:

i) Trip and closing coil of HT circuit breaker
ii) Spring charging motors for HT circuit breaker
iii) Annunciator and Indication circuit of HT panel
iv) Auxiliary supply to protection relays

11.3.2 The battery sizing shall account for suitable temperature correction factors, ageing factors of 1.25, design margin of 1.25 & depth of discharge of 80%.

11.3.3 The design of the battery bank and sizing calculation along with the data sheet for the battery and battery charger shall be submitted for approval.

11.3.4 Battery voltage – 220V dc or 110V dc (as per system requirement)

11.4 BATTERY CHARGER

11.4.1 The Float Charger shall be used to supply normal DC loads and float charging currentof charged battery. The Float cum Boost charger shall be designed to supply boost charging current requirement of the associated battery as well as to supply normal DC load. After full discharge of battery bank, the Float Cum boost charger shall be capable of charging the battery to its full capacity in 8 hours duration while supplyingnormal DC load.

11.4.2 The float charger shall have both auto and manual voltage regulation

arrangements with provision of selector switch.

11.4.3 Suitable filter circuits shall be provided in all the chargers to limit the ripple content (peak to peak) in the output voltage and current to 2% and 5% respectively.

11.4.4 Digital Outputs shall be configured for connection to the SCADA to monitor the outputs like charger output current, output voltage, float/boost mode, etc.

11.4.5 The charging equipment shall be housed in a free standing, floor mounted compartmentalized panels. Panel shall have provision for bottom cable entry with removable undrilled cable gland plate of 3.0 mm thickness.

11.4.6 The panel shall be of CRCA sheet steel construction having thickness of at least 2.0 mm. Degree of protection provided by the enclosure to the internals of charger shall be IP 42.

11.4.7 The instruments, switches and indicating lamps shall be flush mounted on the front panel.

11.5 DC DISTRIBUTION BOARD (DCDB)

11.5.1 DCDB shall be an integral part of battery charger panel board.

11.5.2 Doors and covers shall be provided with neoprene gaskets to prevent entry of vermin and dust. Also, door shall be provided with lock and key arrangement to prevent unauthorized access to the board.

11.5.3 DCDB shall have adequate number of outgoing feeders with double pole, DC MCBs. At least 20% feeders shall be provided as spare.

11.6 WARRANTY

Batteries and battery charger shall be warranted against all material / manufacturing defects and workmanship for minimum of 12 (Twelve) months from the date of operational acceptance i.e. up to defect liability Period.

11.7 TESTS

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP)approved by the Purchaser.

12. EARTHING

12.1 STANDARDS AND CODES

Earthing system shall comply with latest revisions and amendments of the relevant IEC standards and IS codes. In particular, earthing system shall comply with the followingstandards and codes.

Standard/Code	Description
IS 3043	Code of Practice for Earthing
IEC 62561-2	Requirements for conductors and earth electrodes
IEC 62561-7	Requirements for earthing enhancing compounds
IEEE 80	IEEE Guide for Safety in AC Substation Grounding
IEEE 142	IEEE Recommended Practice for Grounding of Industrial andCommercial Power Systems
Indian Electricity Rules	

12.2 GENERAL REQUIREMENTS

12.2.1 Earthing system shall be designed based on system fault current and soil resistivity value obtained from geo-technical investigation report. Earth grid shall be formed consisting of number of earth electrodes sufficient enough to dissipate the system fault current interconnected by earthing conductors.

12.2.2 The earth electrode shall be made of high tensile low carbon steel rod, molecularly bonded by high conductivity copper on outer surface with coating thickness not less than 250 micron as per relevant standards. Suitable earth enhancing material shall be filled around the electrode to lower the resistance to earth. Inspection chamber and lid shall be provided as per IS 3043.

12.2.3 Earth conductors shall be made of copper bonded steel or galvanized steel

of sufficient cross section to carry the fault current and withstand corrosion.

12.2.4 Earth conductors buried in ground shall be laid minimum 600 mm below ground level

12.2.5 unless otherwise indicated in the drawing. Back filling material to be placed over buried conductors shall be free from stones and harmful mixtures.

12.2.6 Earth electrodes shall not be situated within 1.5m from any building whose installation system is being earthed. Minimum distance between earth electrodes shall be two times the driven depth of the electrode.

12.2.7 Transformer yard and switchyard fence shall be connected to the earth grid by one GS flat and gates by flexible lead to the earthed post.

12.2.8 All welded connections shall be made by electric arc welding. For rust protection, the welds should be treated with red lead compound and afterwards thickly coated with bitumen compound.

12.3 EARTHING OF PV ARRAY FIELD

12.3.1 All PV Modules, Module Mounting Structures (MMS) and String Combiner Box (SCB) structures in the PV array field shall be bonded to the earthing system by two distinctconnections.

12.3.2 Each PV Module frame shall be earthed using copper wire of sufficient cross section. The copper wire shall be connected to the earth hole provided in the module frame using suitable arrangement in line with the manufacturer recommendation. The earthing arrangement shall use stainless washers to prevent galvanic corrosion between aluminium frame and copper wire. In order to achieve effective earthing, serrated washers shall be employed to penetrate the anodization layer of the module frame.

12.3.3 Continuous copper earthing wire shall be run to connect a group of modules and both ends of the loop shall be bolted to the DC earth grid using bimetallic lugs and stainless-steel fasteners. The copper earthing wire shall be routed in such a way to avoid physical contact with the module aluminium frame.

12.3.4 The connection between MMS and DC earth grid shall be bolted or welded.

Portion of the MMS which undergoes welding at site shall be coated with two coats of cold galvanising and anti-corrosion paint afterwards.

12.3.5 Earth electrodes of the DC earth grid shall be uniformly distributed throughout the PV array field so that optimum earth resistance is offered to leakage current flowing from any module frame or MMS.

12.3.6 SCB equipment earthing point shall be connected to the DC earth grid using flexible copper cable of sufficient cross section as recommended by the manufacturer. The connection with the DC earth grid shall be done using suitable bimetallic lugs and stainless-steel fasteners.

12.4 PCU EARTHING

DC negative bus bar of the PCU shall be earthed to avoid Potential Induced Degradation (PID). DC negative bus bar and PCU equipment earth shall be bonded to the PCU earth bus and connected to earth electrodes through flexible copper cable of sufficient cross section as mentioned by the manufacturer. The interconnection of PCU earth electrodes with DC earth grid shall be as per PCU manufacturer recommendation. In case DC negative grounding is not possible, appropriate anti-PID device shall be provided.

12.5 TRANSFORMER EARTHING

12.5.1 Inverter transformer neutral shall be floating, not to be earthed. However, recommendation of inverter manufacturer shall also be taken into account.

12.5.2 Transformer tank, cable box, marshalling box and all other body earth points shall be earthed.

12.5.3 Inverter transformer shield shall be earthed separately using minimum two no. of earth electrodes. Earthing conductor between shield bushing and earth electrodes shall be copper flat of suitable size not less than 25 x 6 mm.

12.5.4 Neutral and body of the auxiliary transformer shall be earthed.

12.6 INVERTER ROOM AND MAIN CONTROL ROOM EARTHING (AS APPLICABLE)

12.6.1 Metallic enclosure of all electrical equipment inside the inverter room and main control room shall be connected to the earth grid by two separate and distinct connections.

12.6.2 Cable racks and trays shall be connected to the earth grid at minimum two places using galvanized steel flat.

12.6.3 SCADA and other related electronic devices shall be earthed separately using minimum two no. of earth electrodes.

12.7 SWITCHYARD EARTHING

The metallic frame work of all switchyard equipment and support structures shall be connected to the earth grid by means of two separate and distinct connections. Switchyard shall be shielded against direct lightning stroke by provision of overhead shield wire or earth wire or spikes(masts) or a combination there of as per CEA regulations 2010 (Technical standards)-42(2)I.

12.8 TESTS

Type test reports for earthing electrode, earth enhancing compound and its associated accessories shall be submitted during detailed engineering for approval.

On completion of installation, continuity of earth conductors and efficiency of all bonds and joints shall be checked. Earth resistance at earth terminations shall be measured and recorded.

The earth plate shall be provided to facilitate its identification and for carrying out periodical inspection.

13. LIGHTNING PROTECTION SYSTEM

13.1 Lightning Protection System (LPS) for entire plant against direct and indirect lighting strokes shall be provided as per IS/IEC 62305:2010 or NFC 17-102:2011.

13.2 Lightning Protection Level for the entire plant shall be Level-III.

13.3 LPS AS PER IEC 62305

Location of air terminals shall be designed as per rolling sphere method.

13.4 LPS AS PER NFC 17-102

Lightning Protection System shall consist of following accessories.

i. Early Streamer Emission (ESE) air terminal

ii. Highly insulated poly-plastic adaptor to fix the ESE air terminal with the FRP mast

iii. Fiberglass Reinforced Plastic (FRP) mast

iv. Coupler to connect FRP mast with GI mast

v. GI tubular pole supported on RCC pedestal and foundation structure through Base plate & Anchor bolt assembly

vi. Down-conductor: PVC insulated flexible copper cable of suitable size complying with EN 50164-2 or equivalent standard. It shall be routed along the mast with suitable fixings and connecters

vii. Test joint with each down conductor

viii. Lightning event counter complying with EN 50164-6 or equivalent standard. It shall be fixed at suitable height in series with the down conductor.

ix. Earth termination system in accordance with NFC 17-102. Earth electrodes shall comply with the EN 50164-2 or equivalent standard. Earth enhancing compounds complying with EN 50164-7 or equivalent standard, may be used where soil resistivity is higher and making it impossible to achieve system resistance within specified limit.

13.5 Air terminals, down conductors and earth termination system shall be designed as perrelevant parts of IS/IEC 62305:2010.

13.6 Accessories listed above are indicative only and any other fittings or

accessories, which are usual or necessary for satisfactory operation of the lightning protection shall be provided by the Contractor without extra charges.

13.7 Necessary foundation/anchoring for holding the lightning mast in position to be made after giving due consideration to shadow on PV array, maximum wind speed and maintenance requirement at site in future.

13.8 The product shall be warranted for minimum of 2 (two) years against all material/ manufacturing defects and workmanship.

13.9 Type test reports as per IEC 62305:2010 shall be submitted during detailed engineering for approval.

14. COMMUNICATION CABLES

14.1 OPTICAL FIBRE CABLES

14.1.1 Optic Fibre cable shall be 4/8/12 core, galvanized corrugated steel taped armoured, fully water blocked with dielectric central member for outdoor/ indoor application so as to prevent any physical damage.

14.1.2 The cable shall have multiple single-mode or multimode fibres on as required basis so as to avoid the usage of any repeaters.

14.1.3 The outer sheath shall have Flame Retardant, UV resistant properties and are to be identified with the manufacturer's name, year of manufacturing, progressive automatic sequential on-line marking of length in meters at every meter on outer sheath.

14.1.4 The cable core shall have suitable characteristics and strengthening for prevention of damage during pulling.

14.1.5 All testing of the optic fibre cable being supplied shall be as per the relevant IEC, EIA and other international standards.

14.1.6 The Contractor shall ensure that minimum 100% cores are kept as spare in all types of optical fibre cables.

14.1.7 Cables shall be suitable for laying in conduits, ducts, trenches, racks and underground buried installation.

14.1.8 Spliced/ Repaired cables are not acceptable. Penetration of water resistance and impact resistance shall be as per IEC standard.

14.2 COMMUNICATION CABLE (MODBUS)

14.2.1 Data (Modbus) Cable to be used shall be shielded type with stranded copper conductor. Cable shall have minimum 2 pair each with conductor size of 0.5 Sq.mm.Cable shall be flame retardant according to IEC 60332-1-2.

14.2.2 Cable shall be tested for Peak working voltage of not less than 300 V and shall be suitable for serial interfaces (RS 422 and RS 485).

14.2.3 Communication cable shall be laid through underground with suitable HDPE ducts.

15. SCADA

15.1 GENERAL REQUIREMENTS

15.1.1 The Contractor shall provide complete SCADA system with all accessories, auxiliaries and associated equipment and cables for the safe, efficient and reliable **Operation and Monitoring of entire solar plant and its auxiliary systems**.

15.1.2 HT Switchgear shall be out door type, **Operatable both from local site as well as from Control Room through SCADA.**

15.1.3 The Contractor shall provide all the components including, but not limited to, Hardware, Software, Panels, GPS Clock, Power Supply, HMI, Laser Printer, Gateway, Networking equipment and associated Cables, firewall etc. needed for the completeness.

15.1.4 SCADA System shall have the provision to perform the following features and/or functions:

i) Web enabled Operator Dashboards: Showing key information on Generation, Performance and Current Status of various equipment in Single Line Diagram (SLD) format with capability to monitor PV array Zone level (i.e. SCB level) parameters.

ii) Real time Data Logging with Integrated Analytics & Reporting: Logging of

all parameters - AC, DC, Weather, System Run Hours, Equipment Status and Alarms as well as derived/ calculated/ integrated values. The SCADA User interface shall be customizable and enable Report Generation and Graphical Analysis.

iii) Fault and System Diagnostics with time stamped event logging.

iv) Support for AMC Activities: The interface shall allow integration with Module Cleaning System and various other AMC support systems to provide a Data Analysis and Decision Support System for smooth and efficient Plant Operations.

v) AI based Distributed Analytics for Predictive Maintenance, trend analysis and Alerts.

vi) Generate, store and retrieve user configurable Sequence of Event (SOE) Reports.

vii) Interface with different field equipment in the plant and work seamlessly with field equipment supplied by different companies.

viii) Transfer of plant data reliably, to a Cloud server on any kind of remote network including low bandwidth and wireless links such as 3G/4G/VSAT

(Note: Telecom Lease line connection, if required for transferring data from Plant over internet shall be taken by Contractor in the name of Purchaser for AMC period)

15.1.5 The Control system shall be designed to operate in non-air-conditioned area.

15.2 ARCHITECTURE

15.2.1 The SCADA System shall be built over Industrial IoT architecture with integrated Analytics, secure web access, enterprise software and Database.

15.2.2 Data acquisition shall be distributed across at Local Control Room (LCR) i.e. outdoor station with PCU, switchgear, Battery Bank & charger / UPS and communication panel and existing main control room at 400kV substation, BBMB Bhiwani and 220kV substation, BBMB Hisar, while plant level data aggregation shall be done as specified by Purchaser.

Data communication system shall be built over fibre optic cables/ wireless network with high bandwidth TCP/IP communication (Fast Ethernet or

802.11a/b/g/n) across all Inverter and Control Rooms with Internet/Intranet access at existing Main Control Room. Firewall shall be provided for network security.

Monitoring of solar data of Hisar substation shall also be done at the control room of 400kV substation, BBMB Bhiwani and vise versa. Necessary connectivity in this regard shall be in the scope of Bidder.

15.2.3 Analog and Digital IO modules shall have integrated processor for distributed IO processing and control.

15.2.4 Plant SCADA Server shall have Industrial Grade server hardware running SCADA & Monitoring Software with data storage (complete plant data) space for at least 2 years.

15.2.5 Plant data for monitoring and control operations should be accessible without dependence on external network.

15.2.6 A virtual / cloud server running SCADA & Monitoring Software for both Bhiwani & Hisar site shall be configured in parallel (replicate) with Plant Server to enable easy access to plant data from outside the plant without having to login to plant server.

Note: Configuration of Cloud server and procurement of associated subscription services shall be in the scope of the EPC Contractor.

15.2.7 Operator Workstation/PC shall be of Industrial Grade for browser-based access to plant data from Plant or remote server. Plant control & SLDC/Utility related operations shall only be initiated through browser-based interface requiring no client software or database to be installed on the Workstation. All critical software and Plant Data shall be installed/stored on local and remote servers only with user access control for protecting the software and data assets from accidental deletion or corruption.

15.2.8 Internet/Intranet at Plant: Public or private network access shall be provided at the plant through any broadband/VSAT connectivity of 2Mbps or higher bandwidth. In case no broadband/VSAT connectivity can be provided at the plant, a 3G/4G data card from any Internet Service Provider (ISP) may be provided. SCADA system shall be capable of sending all plant data in real

time to the server at Bhiwani (for both Bhiwani & Hisar sites).

15.2.9 GPS based Time Synchronization System: The SCADA system shall have a Master/Slave Clock system along with antenna, receiver, cabinet and internal interconnection cables. All SCADA controllers, servers, OWS and communicating equipment shall be synchronized to the GPS clock.

15.3 INDUSTRIAL IOT CONTROLLERS & DATA ACQUISITION

The Plant SCADA and Monitoring System may use one or more IIoT Controllers at each Inverter Control Room and existing main control room for the purpose of data acquisition and data forwarding to the SCADA Servers. The IIoT Controllers shall meet the following minimum requirements:

15.3.1 The IIoT Controllers shall be distributed in nature and work independently of otherIIoT Controllers or any central controller in the system.

15.3.2 Shall be capable of supporting wide range of field protocols to communicate with different field equipment (Modbus over RS485/Ethernet, etc.)

15.3.3 Shall have local storage for a minimum of 2 weeks (in case of network failure).

15.3.4 Provide web-based interface to configure the controller for various equipment in the field.

15.3.5 IO Functionality: Shall support status monitoring of CBs & Trip relays on RMU/HT & Transformer panels through distributed DI/AI modules.

15.3.6 Controls: Shall be capable of Controlling breakers (ON/OFF). Both ON/OFF and Parameter control of inverters shall be supported.

15.3.7 Data Communication with Servers: Shall send the data collected, from all the equipment at Inverter Control Room and/or Main Control Room, to the Monitoring & Control Server.

15.3.8 Controllers shall be capable of sending data over Internet connections USB data cards.

15.3.9 Shall not require a static public IP address, at the plant for the purpose of remote access.

15.4 FUNCTIONALITIES

15.4.1 SCADA system shall enable PV array Zone monitoring i.e. the total current from each String Combiner Box shall be monitored on the DC side of the inverter (Central).

15.4.2 The SCADA system shall monitor instantaneous and cumulative electrical parameters from all DC& AC Equipment including inverters, weather station, MFM, Transformer and Switchgear (LT & HT Panels) at regular intervals not greater than one minute.

15.4.3 The SCADA system shall monitor Instantaneous and cumulative environment parameters from weather sensors or data loggers at same interval as electrical parameters and provide PR, CUF on the fly.

15.4.4 The SCADA system shall provide Alarms and Alerts on equipment faults and failure in less than 5 seconds. Alarms on status change of hardwired DI shall also be provided.

15.4.5 The SCADA system shall provide configurable alerts on any parameter crossing settable thresholds. The list of such parameters shall be finalised in consultation with the Purchaser.

15.4.6 The SCADA system shall enable integration with other sub-systems at the plant for supporting AMC activities. The list shall include but not limited to:

i) Surveillance cameras.

ii) Module Cleaning System – For monitoring of water usage and efficacy of cleaning process (in case of Wet Type Cleaning System).

15.4.7 The SCADA system shall have user-friendly browser-based User Interface for secure access from anywhere, for minimum ten concurrent connections from the Operator PC or other securely connected laptop/mobile, for plant monitoring, AMC, daily reporting, and analysis. A dashboard providing summary details of total plant generation, day's export, irradiance, Inverter Control Room level generation and performance indicators like PR and CUF.

15.4.8 Reporting: The SCADA system shall provide downloadable reports in Excel/PDF, configurable for equipment parameters across the plant.

15.4.9 The system shall have Configurable Analysis page for self-configured as well

as on demand Analytics charts.

15.4.10 The SCADA system shall be extensible to include maintenance of O&M schedules and related activities for plant equipment as per the O&M Manual.

15.4.11 Connectivity shall be provided to Purchaser's Data Monitoring Centre. Data collected by Plant SCADA shall be replicated in real-time, using industry standard interfaces such as Web Services, OPC-UA, data files, as required – with BBMB Central Monitoring System (shall be conveyed during detail engineering) . The data recording intervals for different parameters from different devices in the solar plant shall be considered when creating schedules to "push" the data from Plant SCADA to data receivers.

15.4.12 Provision to be kept in SCADA for integration of Ground Mounted solar plant data at Bhiwani and Hisar respectively with Substation Automation System (SAS). Necessary hardware like Gateway / Router / Ethernet switch if any shall be provided by the bidder.

15.4.13 Mobile User Interface: summary of plant performance and issues should be accessible in a mobile Native UI or browser UI.

15.4.14 Data Communication to SLDC: SCADA system shall provide required interface to integrate with BBMB-SLDC, Chandigarh, in compliance with grid code, to send any parameters specified by SLDC.

<u>Note:</u> The methodology and specification of SLDC interface shall be provided separately by SLDC/BBMB and it shall be the responsibility of the Contractor to determine the same.

15.4.15 Power Plant Control: SCADA system shall provide required interface to the local SCADA operator to set various power control modes (active/reactive power/frequency/PF) through the inverters over industry standard communication protocols like Modbus over TCP/IP.

15.4.16 Forecasting and Scheduling: SCADA shall provide day ahead and week ahead forecasting and scheduling for power generation at the plant as per SLDC/Utility stipulations.

15.4.17 Predictive Maintenance: SCADA system shall have in-built or pluggable frameworks to support AI based Predictive Maintenance for all key equipment

including inverters, transformers and switchgear at the plant.

15.4.18 All programming functionalities shall be password protected to avoid unauthorized modification.

15.4.19 The Contractor shall provide software locks and passwords to Purchaser for all operating & application software. Also, the Contractor shall provide sufficient documentation and program listing so that it is possible for the Purchaser to carry out modification at a later date.

15.5 EARTHING

15.5.1 Two isolated electronic earth pits near to SCADA panel at every Inverter and Control Room with < 1 Ohm resistance shall be provided. One earth pit shall be used for protective/body earth and the other to be used for Signal Earth.

15.5.2 Apart from providing separate earth pits, manufacturer specified earthing recommendations shall be followed for all communicating equipment connected to SCADA. This includes but is not limited to SMBs, Inverters, WMS and Switchgear panels.

15.6 COMMUNICATION CABLE LAYING

15.6.1 All RS485, IO and CAT6 cables shall be laid in separate conduits with a minimum separation of 1.5ft from AC/DC power cables all along.

15.6.2 Power cables shall be laid deep in the trenches first. Data cables shall be laid in separate conduits after partially filling the trenches to ensure minimum 1.5 ft separation between power and communication cables all along the trench.

15.6.3 IO Cables between switch gear panels and SCADA panel shall be laid on separate cable trays, with a minimum of 1.5ft separation from trays carrying AC Power cables.

15.6.4 RS485 & CAT6 cables between switch gear panels or Inverters and SCADA panel shall be laid on separate cable trays, with a minimum of 1.5ft separation from trays carrying AC Power cables.

15.7 CONTROL CABINETS / PANELS / DESKS AT MAIN CONTROL ROOM

15.7.1 The cabinets shall be IP 54 protection class. The Contractor shall ensure that the temperature rise is well within the safe limits for system components even under the worst condition and specification requirements for remote I/O cabinets.

15.7.2 The cabinets shall be totally enclosed, free standing type and shall be constructed with minimum 2 mm thick steel plate frame and 1.6 mm thick CRCA steel sheet or as per supplier's standard practice for similar applications.

15.8 SOFTWARE LICENCES

The Contractor shall provide software license for all software being used in Contractor's System. The software licenses shall be provided for the project and shallnot be hardware/ machine-specific.

15.9 HARDWARE AT MAIN CONTROL ROOM

15.9.1 The Hardware as specified shall be based on latest state of the art Workstations and Servers and technology suitable for industrial application & power plant environment.

15.9.2 The Local Monitoring & Control Server and the Operating Work station, to be deployed in the Plant Control Room, shall have the following server hardware and operating system along with accessories:

Plant Server	
Server Hardware	Hex/Octal Core Xeon, 32GB RAM (expandable to 64 GB RAM), 4 X 2TB SATA hard discs in RAID 5 configuration, 2TB external USB hard disc (for backup), dual power supplies, 2 LAN ports, LCD console, keyboard & mouse. The Server hardware shall be housed in a rugged fan-cooled, and rodent-proof Server Rack.

Operating System	Operating System and Database shall be of enterprise scale (Preferably RedHat Linux or equivalent Linux OS, Oracle/MySQL or equivalent DB), with required AMC for 5 years.
Accessories	1. Monitor: Min 24” LED Flat Monitor withnon-interfaced refresh rate min. 75 Hz. 2. Keyboard: ASCII type 3. Pointing Device: Mouse 4. Intelligent UPS (on line): Minimum 2 hour battery backup.
Operator Workstation	
Hardware	i7 CPU running at 3.0 GHz or faster with 8GB RAM, 500GB hard disk, 25” LED monitor,keyboard and mouse, 4 USB ports, LAN port
Operating System	Windows operating system with necessarytools, anti-virus software.
Accessories	1. Screen Display Unit: Min 50” LED Flat Monitor with wall mounted arrangement for the display of SCADA screen 2. A4 size monochrome laser printer. 3. UPS of required capacity with 2 hour battery backup.

15.9.3 All network components of LAN and Workstations shall be compatible to the LAN, without degrading its performance.

15.9.4 The successful vendor is to provide furniture of M/s Godrej Interio/Harmony Systems/Lords Engineering for plant server and operator workstation to be in installed in the main control room. Two nos. tables having wooden top suitable for placing various equipment such as monitor, plant server & operator station, printer, keyboard, mouse etc. along with four numbers revolving ergonomic cushioned chairs etc., in case additional furniture is required same shall be provided by the contractor.

15.10 FACTORY ACCEPTANCE TEST (FAT)

FAT procedure shall be submitted by bidder for approval. SCADA shall communicate with all third devices which are part of solar plant and same shall be demonstrated during the FAT.

15.11 CYBER SECURITY

The contractor shall submit the non-disclosure agreement as per Format F-25 enclosed in the specification. System being offered shall conform to IEC 62443-2-3, IEC/ISO:62443-2-4 and IEC/ISO:62443-3-3 requirements for Cyber Security. Before operational acceptance, the contractor shall carry out Cyber Security audit from CERT-IN certified auditor and VAPT (Vulnerability and penetration testing) of the complete system and implement the recommendation given by the auditor in consultation with site-in-charge. The charges for the same shall be deemed to be included in the quoted rates by bidder (in the scope of bidder).

Firewall, Antivirus their updates or any other device required for cyber security are in the scope of bidder . During AMC the Purchaser and contractor r shall comply with cyber security guidelines issued by the Central Government, from time to time, and the technical standards for communication system in Power Sector laid down by the Authority. All update of Antivirus shall be in bidder scope up-to AMC period.

15.12 WARRANTY

SCADA and associated equipment’s including software and hardware shall be warranted against all material/manufacturing defects and workmanship for minimum of 12 (Twelve) months from the date of operational acceptance i.e. up to defect liability Period. All update of Antivirus shall be in bidder scope up-to AMC period.

16. ILLUMINATION

16.1 STANDARDS AND CODES

LED luminaires shall be tested at independent laboratory as per the following test standards.

Standard/Code	Description
LM79-08	Electrical and Photometric Measurements of Solid-State LightingProducts
LM 80-15	Measuring Luminous Flux and Color Maintenance of LED Packages, Array and Modules

16.2 GENERAL SPECIFICATION

16.2.1 This specification covers design, supply and installation of uniformly Illumination system along the peripheral & internal roads, switchyard and other facilities inside the plant area.

16.2.2 The Contractor shall furnish Guaranteed Technical Particulars of the LED luminaires, from renowned brands available in the market for approval of Purchaser.

16.2.3 Lighting system shall work on the auxiliary supply and same shall be incorporated in auxiliary loads. The Contractor shall provide minimum 20% of total lighting points as emergency lighting points, fed from UPS DB or DCDB as per scheme adopted by the Contractor.

16.3 LIGHTING LEVELS

16.3.1 The average LUX level of 10 lumen is to be maintained in switchyard. However, a lux level of 20 lumen ((10+10) additional switchable on requirement only) is to be maintained in switchyard on transformer.

16.3.2 The lighting system for outdoor and indoor areas of solar power plant shall be designed in such a way that uniform illumination is achieved.

16.3.3 The lighting level shall take into account appropriate light output ratio of luminaires, coefficient of utilization maintenance factor (of 0.7 or less) to take

into account deterioration with time and dust deposition and illuminance uniformity [Uo] shall be min 0.3.

16.3.4 Plant boundary/ Peripheral area shall be illuminated with post mounted LED floodlights (at every 100m) for area lighting as per following specifications:

Parameter	**Specified Value**
Input Voltage	220 – 240 V AC
Frequency	50 Hz – 60 Hz
LED Power Consumption	50 W
LED Luminous Efficiency	85 lumen / W
LED Luminous Flux	4500 lumen
Lamp Efficiency	> 88 %
Colour Temperature	Cool White
Colour Rendering Index	＞75
Light Distribution	Symmetric / circular spot
Light Design	LED + Reflector
LED Junction Temperature	≤ 80°C
Working Temperature	-40°C – 55°C
IP Grade	IP 65
Mechanical Strength	IK 08
Working Life Span	30000 Hrs
Certification	CE & ROHS
Warranty	3 Years Product Replacement

16.4 LED LUMINAIRE FOR OUTDOOR APPLICATIONS (OTHER THAN PERIPHERAL AREA)

16.4.1 LED luminaires shall meet the following parameters.

Parameter	Specified Value
Input voltage	170 - 260 V
Input Frequency	50 Hz +/-1 Hz
Power Factor	0.90 (Minimum)
Luminaire efficacy	> 90 lumens per watt
Beam Angle	Minimum 120°
Total Harmonic Distortion	< 10 %
Working Humidity	10% - 90% RH (Preferably Hermetically sealedunit)
Degree of Protection	Minimum IP 65 (for Outdoor fixtures)
Luminaire Casing	Powder coated metal / Aluminium.
Colour Temperature	5700 K (cool day light)
Colour Rendering Index	> 65
Moisture protection in caseof casing damage	IP 65 (driver unit shall preferably be totallyencapsulated)

16.4.2 The LED luminaire (outdoor) housing, heat sink, pole mounting bracket, individual LED reflectors and front heat resistant tempered glass should be provided.

16.4.3 The LED luminaire (outdoor) housing should be made of non-corrosive, high-pressure, die-cast aluminium and the housing should be power coated grey, so as to ensure good weatherability. Each individual LED source should be provided with an asymmetrical distribution high reflectance aluminized reflector, which should ensure that the light distribution of the luminaire is suitable for road lighting applications (wide beam distribution) and should ensure high pole to pole spacing.

16.4.4 The luminaire should be provided with in-built power unit and electronic driver.

16.4.5 The luminaire should be suitable for standard street light poles and should be

suitable for side entry and bottom entry (post top).

16.4.6 GI Lighting pole of suitable diameter capable of withstanding system and wind load, shall be provided with average Zn coating thickness of 80micron. The street light poles shall have loop in loop out arrangement for cable entry and light fixture / wiringprotected with suitably rated MCB.

16.4.7 All outdoor lighting system shall be automatically controlled by synchronous timer or photocell. Provision to bypass the timer or photocell shall be provided in the panel.

16.4.8 Lighting panels shall be earthed by two separate and distinct connections with earthing system. Switch boxes, junction boxes, lighting fixtures, etc. shall be earthed by means of separate earth continuity conductor. Cable armour shall be connected to earthing system at both the ends. Proper earthing of street light poles shall be ensured.

16.4.9 Junction box for lighting shall be made of fire-retardant material. The degree of protection shall be IP 65 for outdoor JB.

16.4.10 Lighting cables, wherever exposed to direct sunlight, shall be laid through Double Wall Corrugated (DWC) HDPE conduits.

16.5 LED LUMINAIRE/LAMPS FOR INDOOR APPLICATIONS

16.5.1 LED luminaire/lamps shall have minimum 3-star BEE rating.

16.5.2 All indoor LED luminaire/lamps shall be supplied with proper diffuser to avoid directvisibility of LED and suitable heat sink for longer life.

16.6 WARRANTY

All luminaires shall be warranted against all material / manufacturing defects and workmanship for minimum of 12 (Twelve) months from the date of operational acceptance i.e. up to defect liability Period.

17. WEATHER MONITORING SYSTEM

As a part of weather monitoring system, the Contractor shall provide the following measuring instruments with all necessary software and hardware required to integrate with SCADA.

17.1 PYRANOMETER

17.1.1 The Contractor shall provide Class-A pyranometers (ISO 9060:2018 classification) along with necessary accessories for measuring incidental solar radiation at horizontal and inclined plane of array.

17.1.2 Specification of the pyranometer shall be as follows.

Parameter	**Specification**
Spectral Response (50% points)	0.31 to 2.8 micron
Operating temperature range	0°C to +80°C
Ingress Protection	IP 67
Resolution	Minimum +/- 1W/m^2
Output	Analog output: 4 – 20 mA Serial output: RS485

17.1.3 Each instrument shall be supplied with necessary cables. Calibration certificate with calibration traceability to World Radiation Reference (WRR) or World Radiation Centre (WRC) shall be furnished along with the equipment. The signal cable length shall not exceed 20m. The Contractor shall provide instrument manual in hard and soft form.

17.2 TEMPERATURE SENSOR

The Contractor shall provide minimum 3 (three) temperature sensors (1 (one) for ambient temperature measurement with shielding case and 2 (two) for module temperature measurement) at each site. The temperature sensor shall be Resistance Temperature Detector (RTD)/ Semiconductor type with measurement range of 0°C to 80°C. The instrument shall have valid

calibration certificate.

17.3 ANEMOMETER

Contractor shall provide minimum one no. ultrasonic wind sensor (no moving parts) forwind speed and direction monitoring.

Parameter	**Specification**
Velocity range with accuracy limit	0-60m/s with +/-2% accuracy @12 m/s;Resolution: 0.01m/s
Wind direction range with accuracy limit	0 to 360^{o} (No dead band) with +/-2^{o} accuracy @12 m/s;Resolution: 1^{o}
Mounting Bracket	Anodized Aluminium bracket to reduce corrosion, allmounting bolts of SS
Protection Class	IP 66
Output	RS 485

17.4 DATA LOGGER AND DATA ACQUISITION SYSTEM

Data logger for the weather monitoring station should have the following features:

17.4.1 Provision for analog, digital and counter type inputs for interfacing with various type of sensors

i) Analog Input

- Adequate nos. for all analog sensors with redundancy
- Provision for operation in different current and voltage ranges as perconnected sensors
- Accuracy of +/-0.1% of FS

ii) Digital Inputs

- Adequate no. of Digital inputs and outputs for the application

iii) Provision for RS232 and RS485 serial outputs

iv) Built-in battery backup

v) Connectivity and Data transmission:

- RS485 MODBUS interface for data collection and storage on SCADA
- Communication protocol should support fast data transmission rates, enable operation in different Frequency bands and have an encryption-based data security layer for secure data transmission

vi) Display Settings: Graphic LCD screen which should be easily accessible and should display relevant details like all sensor values, battery strength, network strength etc.

vii) Provision of Time synchronization from telecom time or server time

viii) Data Storage: Provision for at least 2 MB internal Flash Memory and at least 8 GB Micro SD card (expandable)

ix) Protection level: IP 65

18. CCTV CAMERA

18.1 CCTV Cameras along with monitoring stations (sufficient numbers) and all other accessories required for its proper operation must be installed to have complete coverage of following areas for 24 hours.

i) Main entry: Covering all the entry/exit

ii) Along the Plant Perimeter: Covering complete perimeter of Plant Area to capture all possible intrusion

iii) Control Rooms: Covering Entry/Exit and Equipment Rooms

iv) Switchyard

18.2 Monitoring stations of the CCTV Network shall be installed in Main Control Room.

18.3 The CCTV system shall be designed as a standalone IP based network architecture. System shall use video signals from different cameras at defined locations, process the video signals for viewing on monitors at control room and simultaneously record all video streams using latest compression techniques.

18.4 Camera shall be colour, suitable for day and night surveillance (even under

complete darkness) and network compatible.

18.5 It shall be possible to control all cameras i.e., PTZ auto/ manual focus, selection of pre- sets, video tour selection etc. The software shall support flexible 1/2/4/8/16 windows split screen display mode or scroll mode on the display monitor for live video. The size of the screen minimum 43".

18.6 The system shall support video analytics in respect of the following:

i) Video motion detection

ii) Object tracking

iii) Object classification

iv) Camera server shall be provided with sufficient storage space to storage recordings of all cameras at HD mode for a period of 15 days. All recordings shall have camera ID, location, date and time of recording.

19. FIRE ALARM SYSTEM

19.1 STANDARDS AND CODES

Standard/Code	Description
IS 2189	Selection, Installation and Maintenance of Automatic FireDetection and Alarm System Code of Practice
IS 2171	Portable Fire Extinguishers, Dry Powder (Cartridge Type)
IS 8149	Functional requirements for twin CO_2 fire extinguishers (trolleymounted)
IS 2546	Galvanized mild steel fire bucket
National Building code 2016	

19.2 Contractor shall ensure the compliance of fire detection and alarm system as per relevant standards and regulations. The installation shall meet all applicable statutory requirements and safety regulations of state/central fire department/body or any othercompetent authority in terms of fire protection.

19.3 Firefighting system for the proposed power plant for fire protection shall be consisting of but not limited to:

i) Sand buckets

ii) Portable fire extinguishers (CO_2 and dry powder type)
iii) Microprocessor based fire alarm panel
iv) Multi sensor smoke detectors
v) Hooter cum strobe
vi) Manual call points
vii) Cables from sensor to fire Panel.

19.4 Minimum two numbers of fire extinguishers (CO_2 and Foam type each, of capacity 9 kg having BIS certification marking as per IS: 2171) shall be provided at every building/ enclosure, transformer yard and switchyard. However, contractor must comply with existing building code for fire protection and relevant IS codes.

19.5 Four numbers of stand with four sand buckets on each stand shall be provided in the Transformer Yard. Sand buckets inside the building shall be provided at strategic locations as decided during detailed engineering.

19.6 Digital output from the fire detection system shall be integrated with SCADA.

19.7 Contractor shall submit the plan for fire and smoke detection system for the Purchaser's approval.

20. Testing Instruments

The Contractor shall provide the following set of instruments for on-site testing.

20.1 Earth resistance tester

Parameter	**Specification**
Display	Backlit LCD or LED display
Range	Earth Resistance: up to 2000 ΩEarth Voltage: 200 V
Accuracy	± (2% + 5)
Safety Ratings	IP 56
Programmable Limits setting	Enabled

Accessories
Earth Ground Stakes – 4 Nos.
Cable Reels – 3 Nos.
Battery – 2 set
Carry Case with sufficient space for accommodating accessories

20.2 Array tester

Parameter	**Specification**
Display	Backlit LCD or LED display
Functionality	All electrical tests required by IEC 62446- 1:2016
Memory	Up to 200 records & USB downloadable to Computer
Accessories	
A set of two, 4mm fused leads for extra protection during installation tests.	
Leads which enable the array tester to connect directly to PV arrays	
Battery – 2 set	
Carry Case with sufficient space for accommodating accessories	

20.3 Insulation Tester

Parameter	**Specification**
Display	Backlit LCD or LED display
Insulation Test Range	0.1 MΩ to 10 GΩ
Test Voltage	250V, 500V, 1000V, 5000V
Test Voltage accuracy	+20% on positive side only no negativevariation is allowed
Accessories	
Heavy duty Test Leads with Alligator Clips – 1 set	

Battery – 2 set
Carry Case with sufficient space for accommodating accessories

20.4 Digital Multimeter

Parameter	**Specification**
Voltage Range	1500 V DC / 1000 V AC (True RMS)
Display	4 ½ digits, Backlit LCD or LED
Measuring Category	1000 V CAT III as per IEC Standard61010-1
Additional Functions	Resistance, Temperature, Continuity, Diode, Capacitance, Frequency, Duty cycle measurement
Accessories	
Temperature Probe – 1	
Test Leads with Alligator Clips – 1 set	
Battery – 2 set	
Carry Case with sufficient space for accommodating accessories	

20.5 Clamp meter

Parameter	**Specification**
Current Range	400 A DC / 1000 A AC (True RMS)
Display	Backlit LCD or LED display
Measuring Category	1000V CAT III as per IEC 61010-1
Additional Functions	Active, Reactive and Apparent Power,THD, PF
Accessories	
Test Leads – 1 set	

Battery – 2 set
Carry Case with sufficient space for accommodating accessories.

20.6 Infra-Red thermal imaging camera

Parameter	**Specification**
Spectral response	8 µm to 14 µm (LW)
Temperature-sensitivity andcalibration range	–20 °C to +120 °C
Atmospheric air temperature	-10 °C to +40 °C
Thermal sensitivity	NETD ≤ 0.1 K at 30 °C
Geometric resolution	640 x 480 pixels
Absolute error of measurement	< ± 2 K
Adjustable parameters	Emissivity, Reflected temperature
Adjustable functions	Focus, temperature level and span
Measurement functions	Measuring spot, measuring area with averageand maximum temperature
Calibration	The measuring system (Camera, lens, aperture and filter): The thermographic camera has to be traceably calibrated at leastevery two years. The calibration has to bedocumented. If the camera is not compliant(absolute temperature and/or temperature differences), it has to be readjusted by the manufacturer.
Documentation	Storing of the infrared picture with the radiometric data to be able to determine absolute temperatures

20.7 Digital lux meter

Parameter	Specification
Range	0 – 1000 lux
Accuracy	± (2% + 5)
Resolution	1 lux
Display	3½ digits, Backlit LCD/LED
Accessories	
Battery – 2 set	
Carry Case with sufficient space for accommodating accessories.	

20.8 All testing equipment shall possess valid calibration certificate issued from approved NABL labs.

20.9 Instruments of superior rating is allowed after seeking consent of the Purchaser.

20.10 Maintenance, calibration, up keeping, repair & replacement of these tools will be in the scope of the Contractor during AMC.

20.11 It is Contractor's responsibility to arrange for tools, tackles, logistics, test kits, manpower, experts etc. required for trouble free maintenance of Plant.

21. ENERGY MANAGEMENT SYSTEM

21.1 Energy Management System (EMS) system shall be a computerized system for real time monitoring, operation, control, reliable & efficient operation of the Plant facilities. EMS shall be able to acquire real time data of various equipment of Plant facilities, have in built logic/programming to monitor, control, and optimize the performance of Plant facilities as per specification. Contractor shall provide complete EMS system with all accessories, auxiliaries and associated equipment and cables for the safe, efficient and reliable operation of entire Plant facilities and its auxiliary systems. Contractor shall include in his proposal all the Industrial Grade Hardware, Software, Panels,

GPS clock, Power Supply, HMI, Laser Printer, Gateway, Networking equipment and associated Cable etc. needed for the completeness even if the same are not specifically appearing in this specification.

21.2 STANDARDS AND CODES

21.2.1 The EMS shall comply with IEC 61970 for interoperability.

21.2.2 The EMS shall have the functionality to ensure compliance to the CEA Technical standards for Connectivity (2019) regulations.

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

21.3 EMS FUNCTIONALITY FOR THE PLANT CONTROL

21.3.1 The EMS monitors grid and Plant facility variables and should be programmable for selecting the optimum-operating mode of the whole plant w.r.t. active and reactive power, grid voltage, grid frequency, etc. Additionally, it can receive external set points and automatically adapt the Plant Facility behavior to the new settings.

21.3.2 The EMS shall perform following functionality to Control the Plant facilities: Communication with grid or SCADA

- Communications with PV Inverters and other power units
- Measuring and processing of the electrical magnitudes at EMS (voltage, current, PF)
- Control capability of PV Inverters and other power units
- The EMS shall allow following operation modes for the Plant facilities:
- Reactive Control (Q Control, setting point of reactive power Q at EMS)
- Power Factor Control (PF Control, setting point of cos(L) at EMS)
- Voltage Control (V closed loop control, setting point of V at EMS)

- Voltage Droop (Reactive power vs Voltage programmable curve or droop)
- Apparent Power Control (S Lim, setting point of S Lim at EMS)
- Active Power Limitation (P Lim, setting point of P Lim at EMS)

21.3.3 The EMS shall have the functionality to receive the target values specified by operators using a standard protocol (i.e. Modbus TCP/IP).

21.4 CONTROL & POWER SUPPLY SCHEME

Contractor shall provide the UPS/ DC Power supply of suitable rating to cater all the load requirements of EMS system and its auxiliaries.

22. POWER TRANSFORMER

Power Evacuation at Bhiwani site shall be at 132kV, a Power Transformer voltage level 11kV/132kV of suitable rating as per site requirement shall be in bidder's scope.

Power Evacuation at Hisar site shall be at 33kV, requirement of Power Transformer for Hisar site shall be as per bidder design (if required).

Note: For Bhiwani site bidder has to kept the provision of Power Transformer with voltage level 11kV/132kV only.

22.1 STANDARDS AND CODES

Power Transformer shall comply with the latest edition of the following standards and codes including amendments.

Standard	**Description**
IS 2026, IEC 60076	Specification of Power Transformers
IS 2099, IEC 60137	Bushings for alternate voltage above 1000 V
IS 8468	On-load tap changers
IS 335, IEC 60296	Insulating oil
IS 3639	Fittings and Accessories for Power

	Transformers
CBIP manuals of transformer (latest edition)	

22.2 TECHNICAL REQUIREMENTS

Parameter	Specification			
Rated capacity	As per system design			
Rated Voltage	11 kV / 132 kV			
Duty & Service	Continuous duty & Outdoor			
Number of phases	3			
Frequency	50 Hz			
Vector group	YNyn0 (As per system requirement)			
Cooling	ONAN			
Impedance at principal tap and 75°C	10%			
Tap changer	On Load Tap Changer (OLTC) on HV side, +/- 10% with steps of 2.5%			
Winding insulation Level	HV	HVN (If Applicable)	LV	LVN (If applicable)
One min power frequency withstand voltage (kV)	275	70	38	70
Full wave lightning impulse withstand voltage (kVp).	650	170	95	170
Chopped wave lightning impulse withstand voltage (kVp)	715	-	105	-
Switching impulse withstand voltage (kVp)	540	-	-	-

Permissible temperature rise over an ambient of 50°C (irrespective of tap)				
Top oil	50°C			
Winding	55°C			
Fault level & duration	As per system requirement			
Short-circuit withstand time (Thermal)	2 seconds			
Bushing Insulation Level	HV	HVN (If Applicable)	LV	LVN (If applicable)
Rated voltage (kV)	145	36	36	36
One min power frequency withstand voltage (kV)	305	77	77	77
Full wave lightning impulse withstand voltage (kVp)	650	170	170	170
Switching impulse withstand voltage (kVp)	-	-	-	-
Termination	As per system requirement			
Noise level	As per NEMA TR-1			
Loading capability	Continuous operation at rated MVA on any tap with voltage variation of +/- 10%, also transformer shall be capable of being loaded in accordance with IEC 60076-7			
Flux density	Not to exceed 1.9 Wb/sq.m. at any tap position with +/- 10% voltage variation of voltage corresponding to the tap. Transformer shall also withstand following over fluxing conditions due to combined voltage and frequency fluctuations:			

	a) 110% for continuous rating b) 125% for at least one minute c) 140% for at least five seconds The Contractor shall furnish over fluxing characteristic up to 170%
Air clearance	As per CBIP
Base of transformer oil / specification	Naphthenic base / IS : 335

Note :- Above Parameters/Specifications may change as per System Design.

22.3 TANK

22.3.1 The Transformer tank and cover shall be fabricated from high grade low carbon plate steel of adequate thickness. The tank and the tank cover shall be of welded construction. All seams and joints shall be welded and where practicable, they shall be double welded. The tank so welded shall be reinforced by stiffener of structural steel for general rigidity. The thickness of MS plate for bottom, side and top of the tank shall be as per CBIP recommendations.

22.3.2 The transformer top shall be provided with a detachable tank cover with bolted flanged gasket joint. Lifting lugs shall be provided for removing the cover. The surface of the cover shall be suitably sloped so that it does not retain rain water.

22.3.3 The main tank body of the transformer, excluding tap changing compartments and radiators, shall be capable of withstanding pressure of 760mm of Hg.

22.3.4 Inspection hole(s) with welded flange(s) and bolted cover(s) shall be provided on the tank cover. The inspection hole(s) shall be of sufficient size to afford easy access to the lower ends of the bushings, terminals etc.

22.3.5 Suitable guides shall be provided for positioning the various parts during assembly or dismantling. Adequate space shall be provided between the cores and windings and the bottom of the tank for collection of any sediment.

22.3.6 All bolted connections to tank shall be fitted with suitable oil-tight gasket, which shall give satisfactory service under the operating conditions. All gaskets shall be closed design (without open ends) and shall be of one piece only. Gasket of nitrile rubber (NBR) shall be used. Gaskets of neoprene and / or any kind of impregnated / bonded core or cork only which can easily be damaged by over pressing are not acceptable. Use of hemp as gasket material is also not acceptable.

22.3.7 Lifting lugs shall be provided on all parts of the transformer requiring independent handling during assembly or dismantling. In addition, the transformer tank shall be provided with lifting lugs and bosses properly secured to the sides of the tank for lifting the complete transformer assembly with oil either by crane or by jacks.

22.3.8 The transformer tank shall be supported on a structural steel base equipped with forged steel single flanged wheels suitable for moving the transformer completely with oil. The wheels shall be bi-directional and mounted on swivels which may be turned through 90° when the tank is jacked up and capable of being locked in position parallel to and at right angles to the longitudinal axis.

22.4 CORE

22.4.1 The transformer core shall be built up with high-grade non-ageing cold rolled grain oriented (CRGO) silicon steel laminations having high permeability and low hysteresis loss. The thickness of lamination shall be 0.27 mm or less.

22.4.2 The transformer shall be so designed that the flux density in the core shall not exceed 1.7 tesla at rated voltage and rated frequency. The maximum flux density in any part of core or yoke at 10% continuous over voltage condition shall not exceed 1.9 tesla.

22.4.3 The laminations shall be free of all burrs and sharp projections. Each sheet shall have an insulating coating resistant to the action of hot oil.

22.4.4 The core shall be rigidly clamped to ensure adequate mechanical strength and to prevent vibration during operation and transportation. The clamping

structure shall be designed to minimize eddy current loss.

22.4.5 The design of magnetic circuit shall be such as to avoid static discharges, development of short circuit paths within itself or to the earthed clamping structure and production of flux components at right angles to the plane of the laminations which may cause local heating.

22.4.6 The core shall be provided with lugs suitable for lifting the complete CCA of the transformer. The CCA shall be fixed with the tank so that it does not shift when transformer is moved or during short circuit.

22.4.7 The insulation of core to bolts and core to clamp plates shall be able to withstand a voltage of 2 kV RMS for one minute.

22.4.8 The core shall not be earthed at multiple locations. Terminal shall be brought on top of tank and earthed through link. Core and Frame terminals should be brought out on transformer top so as to enable megger.

22.5 WINDING

22.5.1 The conductor for winding shall be made of solid drawn high conductivity electrolytic grade copper. The winding shall be so designed that all coil assemblies of identical voltage ratings shall be interchangeable and field repairs can be readily done without special equipment.

22.5.2 The coils shall be supported between adjacent sections by insulating spacers and barriers. Bracings and other insulation used in the assembly of the windings shall be arranged to ensure a free circulation of the oil and to reduce hot spots in the windings.

22.5.3 The insulation paper shall be of high quality and the value of degree of polymerization shall not be less than 1200 Pv.

22.5.4 Materials used for insulation and assembly of the windings shall be insoluble, non-catalytic and chemically inactive in the hot transformer oil and shall not soften or otherwise get affected under the operating conditions.

22.5.5 All threaded connections shall be provided with locking facilities. All leads from the winding to the terminal board and bushings shall be rigidly supported

to prevent injury from vibration. Guide tubes shall be used where practicable.

22.5.6 The conductor shall be transposed at sufficient intervals in order to minimize eddy currents and equalize the distribution of currents and temperature along the windings.

22.5.7 Windings shall be subjected to a shrinkage treatment before final assembly, so that no further shrinkage occurs during service. Adjustable device shall be provided for taking up any possible shrinkage of coils in service if required.

22.5.8 The windings shall be clamped securely in place so that they will not be displaced or deformed during short circuits. The assembled core and windings shall be vacuum dried and suitably impregnated before removal from the treating tank. The copper conductors used in the coil structure shall be best suited to the requirements and all permanent current carrying joints in the windings and the locks shall be welded or brazed.

22.6 INSULATING OIL

The insulating of naphthenic base (made from naphthenic crude) oil for first filling together with 10% extra shall be supplied with the transformer. The oil shall comply in all respects with the provisions of the latest edition of IS 335 (as amended up to date). Particular attention shall be paid to deliver the oil free from moisture having uniform quality throughout in non-returnable epoxy coated steel drums.

22.7 ON-LOAD TAP CHANGER

22.7.1 On-Load Tap Changer (OLTC) shall be designed for remote control operation from Remote Tap Change Control (RTCC) Panel in the control room in addition to being capable of local manual as well as local electrical operation. The OLTC shall include the following.

i) An oil immersed tap selector and arcing switch or arc suppressing tap selector, provided with reactor or resistor for reduction of make and break arcing voltages and short circuits.

ii) Motor driven mechanism

iii) Control and protection devices

iv) Local / Remote tap changer position indicator

v) Manual / Electrical operating device

vi) Pressure relief device

22.7.2 The OLTC shall be so designed that the contacts do not interrupt arc within the main tank of the transformer. The tap selector and arcing switch or arc suppressing selector switch shall be located in oil filled compartment. The compartment shall be provided with Oil Surge Relay. It shall be designed so as to prevent oil in the tap selector compartment from mixing with the oil in the transformer tank.

22.7.3 The contactors and associated gear for the driving motor shall be housed in a local kiosk mounted adjacent to or on the transformer. The degree of protection of the complete arrangement shall be IP 55 or better. The motor shall be suitable for operation with three phase, 415 V, 50 Hz external power supply.

22.7.4 RTCC Panel Remote Tap Change Control (RTCC) Panel shall include, but not limited to, the following.

i) Automatic Voltage Regulator with SCADA compatibility

ii) Under voltage relay to monitor the taper changer control voltage

iii) Raise and lower push button

iv) Tap position indicator

v) Indication lamp showing tap changing in progress

vi) Alarms and Annunciation

vii) Any other accessory required for satisfactory operation or required during detail engineering.

22.8 BUSHING

22.8.1 The bushings shall have high factor of safety against leakage to ground and

shall be so located as to provide adequate electrical clearances between bushings and grounded parts. Bushings of identical voltage rating shall be interchangeable.

22.8.2 All bushings shall be equipped with terminals suitable for bimetallic connection. Each bushing shall be so coordinated with the transformer insulation that all flash over will occur outside the tank.

22.8.3 Bushings of rated voltage below 52 kV shall be porcelain insulator of oil communicating type or OIP (non-oil communicating).

22.8.4 Bushings of rated voltage 52 kV and above shall be OIP condenser type (non-oil communicating) with porcelain insulator with following fittings.

i) Oil level gauge

ii) Oil filling plug and drain valve if not hermetically sealed

iii) Tap for capacitance and tan delta test.

22.9 RADIATORS

22.9.1 Radiators provided shall have sufficient cooling surface to limit the temperature rise to the values as specified in the 'Technical Requirements'. The transformer shall be provided with 2 completely independent groups of radiators (each of 60% capacity). The radiators shall be seamless and made of mild steel/CRCA with minimum thickness not less than 1.2 mm. It shall be suitably braced to protect them from mechanical shocks.

22.9.2 The radiators shall be connected to the tank by machined steel flanges with adequate gaskets to avoid oil leakage. Each radiator unit shall be provided with butterfly type or positive operated gate type oil leak proof shut-off valve which can be fastened in either closed or open position and separate oil tight flange for each tank connection for use when the radiator unit is detached. Each radiator unit shall have a lifting arrangement and oil drain at the bottom and a vent at the top.

22.9.3 It shall be possible to take out any of the radiator unit without disturbing the transformer. The radiators shall be so designed as to prevent any

accumulation of water on the outer surface or formation of gas pockets when the tank is being filled.

22.10 ACCESSORIES

22.10.1 CONSERVATOR

The conservator shall have air cell type constant oil preservation system to prevent oxidation and contamination of oil due to contact with moisture. The conservator shall be provided with separate compartment for OLTC. No separate conservator tank shall be provided for OLTC. The conservator shall be fitted with oil filling hole, cap and drain valve. Prismatic toughened glass oil level gauge and 150 mm Magnetic Oil Gauge (MOG) with low oil level alarm contact shall also be provided.

22.10.2 SILICA GEL BREATHER

The top of the conservator shall be connected to the atmosphere through indicating type cobalt free silica gel dehydrating breather with transparent enclosure. Silica gel shall be isolated from atmosphere by an oil seal. The capacity of breather should be such that it can contain minimum 5 kg silica gel for main conservator compartment and minimum 1 kg silica gel for OLTC conservator compartment. The GI pipe connecting breather with conservator should be seamless and no joint is permitted.

22.10.3 BUCHHOLZ RELAY

Buchholz relay, double float type with alarm and trip contacts, along with suitable gas collecting arrangement shall be provided. The relay shall be provided with a test cock suitable for a flexible pipe connection for checking its operation and taking gas sample. A copper or stainless-steel tube shall be connected from the gas collector to a valve located about 1200 mm above ground level to facilitate sampling when the transformer in service. The relay shall be provided with shut off valve on the conservator side as well as on the tank side.

22.10.4 PRESSURE RELIEF DEVICE

Pressure Relief Device shall be provided on main tank and OLTC for rapid release of any pressure in transformer which may endanger the equipment. The device shall operate at a static pressure of less than hydraulic test pressure of transformer tank/OLTC chamber. The terminal box of the PRD shall be water tight with protection class IP 56 or better as per IEC 60529. Electrically insulated contact shall be provided for trip signal.

22.10.5 TEMPERATURE INDICATORS

22.10.5.1 Oil Temperature Indicator (OTI) 150 mm dial type temperature indicator with 'Maximum' reading pointer and resetting device shall be provided. The indicator shall have adjustable, electrically independent, potential free alarm and trip contacts. A temperature sensing element suitably located in a pocket on top oil shall be provided. Accuracy class of OTI shall be 1.5% or better.

22.10.5.2 WINDING TEMPERATURE INDICATOR (WTI)

A device for measuring the hot spot temperature of each of the winding shall be provided. It shall comprise the following.

i) Temperature sensing elements, one each on HV and LV winding.

ii) Image coil.

iii) Auxiliary CTs, if required to match the image coil.

iv) 150 mm dial type temperature indicator with 'Maximum' reading pointer and resetting device with adjustable, electrically independent, potential free alarm and trip contacts.

v) Calibration device.

vi) The winding temperature indicator shall be responsive to the combination of top oil temperature and winding current, calibrated to follow the hottest spot temperature of the transformer winding. Accuracy class of WTI shall be 1.5% or better.

22.10.6 MARSHALLING BOX

Marshalling Box shall be of sheet steel, dust and vermin proof provided with proper lighting and thermostatically controlled space heaters. The degree of protection shall be IP 55. One dummy terminal block in between each trip wire terminal shall be provided. At least 10% spare terminals shall be provided on each panel. The gasket used shall be of neoprene or synthetic rubber. Wiring scheme (TB details) shall be engraved in a stainless-steel plate with viewable font size and the same shall be fixed inside the marshalling box door.

22.10.7 VALVES

The transformer shall be provided with the following (but not limited to) valves.

i) Two nos. of filter valves, one at top and another at bottom on diagonally opposite corners

ii) Two nos. of sampling valves at top and bottom of the tank

iii) Drain valve on main tank

iv) Drain valves on main and OLTC compartment of conservator

v) Valves (for nitrogen injection and oil drain) as required by firefighting system.

All valves shall be constructed of stainless steel, brass or gun metal except of shutoff valve for radiator and cooler. For radiator and cooler, valve shall be made up of gun metal or cast iron.

22.11 PAINTING

22.11.1 Before painting or filling with oil, un-galvanized parts shall be completely cleaned and free from rust, scale and grease. All external rough surfaces on casting shall be filled by metal deposition. The interior of transformer tank and other filled chambers and internal structural steel work shall be cleaned of all scale and rust by send blasting or other approved method. These surfaces shall be painted with an oil resisting paint of grey Colour (shade 631 of IS : 5).

22.11.2 Except for nuts, bolts and washers, all external surfaces shall receive a minimum of three coats of paint. The primary coat shall be applied immediately after cleaning. The second coat shall be of oil paint of weather resisting nature. The final coat shall be of a glossy, oil and weather resisting non-fading paint. The paint shade shall be as provided by the Employer during detailed engineering.

22.11.3 All internal surfaces of mechanism chambers and kiosk except those which have received anticorrosion treatment, shall receive three coats of paint applied to the thoroughly cleaned metal surface. The final coat shall be of light coloured anti condensation mixture.

22.11.4 Any damage to paint work incurred during transport and erection shall be made good by thoroughly cleaning the damaged portion and by applying full number of coats of paints.

22.12 TRANSPORTATION

22.12.1 Transformer tank is filled with oil or pure dry nitrogen/ air depending upon the transport weight limitations. Necessary arrangement shall be ensured to take care of pressure drop of nitrogen or dry air during transit and storage till completion of oil filling during erection. A gas pressure testing valve with necessary pressure gauge and adaptor valve shall be provided.

22.12.2 Bushings shall be crated, packed and transported as per standard guide lines of the Bushing Manufacturer. All care should be taken to avoid any damage of the porcelain due to vibration during transport.

22.12.3 Special attention shall be paid in packing the accessories & spares to avoid moisture ingress. All parts shall be adequately marked to facilitate field erection.

22.13 WARRANTY

The power transformer shall be warranted for minimum of 60 months from the date of operational acceptance or 66 months from the date of dispatch whichever period may expire earlier against all material/ manufacturing defects and workmanship.

22.14 TESTING AND INSPECTION

22.14.1 Type Tests and Special Tests

The following type test and special test reports shall be submitted during detailed engineering. The tests should have been conducted on the similar transformer by NABL accredited laboratory.

22.14.1.1 TYPE TESTS

i) Lightning impulse (Full & Chopped Wave) test on windings as per IS 20263/IEC 60076-3

ii) Temperature Rise test at a tap corresponding to maximum losses as per IS 2026-2/IEC 60076-2. Dissolved Gas Analysis (DGA) shall be conducted on oil sample taken before and immediately after temperature rise test. Gas analysis shall be as per IS 9434/IEC 60567 and results will be interpreted as per IS 10593/IEC 60599.

22.14.1.2 SPECIAL TESTS

i) Short circuit withstand test as per IS 2026-5/IEC 60076-5

ii) Measurement of zero-sequence impedance as per IS 2026-1/IEC 60076-1

iii) Measurement of harmonics of no-load current as per IS IEC 60076-1

iv) Measurement of acoustic noise level as per NEMA TR-1

In case the contractor is not able to submit the test reports during detailed engineering, the contractor shall submit the reports of type/special tests either conducted by NABL accredited laboratory or witnessed by Purchaser. However, for short circuit withstand test he may furnish the calculations for thermal and dynamic withstand capacity of the offered transformer as per his design to validate ability of transformer to withstand the short circuit.

22.14.2 ROUTINE TESTS

Each completed transformer shall be subjected to following routine tests as per the latest edition of IEC 60076 unless specified otherwise and to be witnessed by the purchaser: -

i) Measurement of winding resistance at each tap

ii) Measurement of voltage ratio between HV and LV windings at each tap

iii) Check of vector group

iv) Measurement of no-load loss and no-load current at 90%, 100% & 110% of rated voltage

v) Measurement of short-circuit impedance and load loss at principal and extreme taps

vi) Magnetic balance test & magnetizing current test as per CBIP manual publication no. 295

vii) Separate source voltage withstand test

viii) Induced over voltage withstand test

ix) Measurement of insulation resistance and polarization index.

x) Measurement of tan delta and capacitance of winding

xi) Core isolation test

xii) Marshalling box functional test

xiii) IR Measurement on wiring of marshalling box

xiv) Test on on-load tap changer

xv) Breakdown voltage test on transformer oil as per IS 335

xvi) Jacking test followed by D.P. test

xvii) Oil leakage test on completely assembled transformer along with radiators.

22.14.3 TESTING OF TRANSFORMER OIL

The supplier shall submit test results of naphthenic base transformer oil for all the tests mentioned in IS : 335 (2018) conducted from a NABL accredited lab

at least three weeks before offering the transformer for inspection.

23. NITROGEN INJECTION FIRE PROTECTION SYSTEM

Nitrogen Injection Fire Protection System (NIFPS) shall use nitrogen as fire quenching medium. The protection system shall prevent transformer oil tank explosion and possible fire in case of internal faults. In the event of fire by external causes such as bushing fire, OLTC fire, fire from surrounding equipment etc., it shall act as a fast and effective fire extinguisher without any manual intervention.

23.1 STANDARDS AND CODES

All the equipment of NIFPS shall comply with the latest edition of the following standards and codes including amendments.

Standard	**Description**
IS 10028-2	Code of practice for selection, installation and maintenance of transformers; Part 2: Installation
IS 7285-2	Refillable Seamless Steel Gas Cylinders - Specification Part 2: Quenched and Tempered Steel Cylinders With Tensile Strength Less Than 1100 MPa (112 kgf/mm2)
CEA Technical Standards for Construction of Electrical Plants and Electric Lines Regulations, 2010 with 2015 amendment	
CEA Measures relating to Safety and Electric Supply Regulations, 2010 with 2015 amendment	
CBIP Manual on Transformers, Publication No. 317	

23.2 TECHNICAL REQUIREMENTS

Parameter	**Specification**
Fire extinction period from commencement of nitrogen injection	30 second (maximum)
Total time duration to bring oil temperature below flash point	30 minute (maximum)

Fire detector heat sensing temperature	141°C
TCIV setting for normal operation to ensure no obstacle for transformer breathing	40 litre per minute
TCIV setting for operation during abnormal flow of oil	60 litre per minute
Capacity of nitrogen gas cylinder	10 m^3 gas at pressure of 150 kg/cm2 for up to 60,000 litre of oil 20 m^3 gas at pressure of 150 kg/cm2 for above 60,000 litre of oil

23.3 SYSTEM COMPONENTS

NIFPS shall broadly consists of the following components. However, all other components which are necessary for fast, reliable and effective working of the fire protection system shall be deemed to be included in the scope of supply. The NIFPS shall have provision for SCADA connectivity.

23.3.1 FIRE EXTINGUISHING CUBICLE

The Fire Extinguishing Cubicle (FEC) shall be made of CRCA sheet of minimum 3 mm thick with Polyurethane painting. The degree of protection shall be IP55 or better. It shall have hinged split doors fitted with high quality tamper proof lock. The following components shall be provided in the FEC.

i) Nitrogen gas cylinder with regulator and falling pressure electrical contact manometer. The nitrogen gas cylinder should have been certified by Bureau of Indian Standards and approved by Chief Controller of Explosives, Government of India.

ii) Oil drain pipe with mechanical quick drain valve

iii) Control equipment for draining of oil and injecting nitrogen gas

iv) Pressure monitoring switch for backup protection for nitrogen release

v) Limit switches for monitoring of the system

vi) Butterfly valve with flanges on top of the cubicle for connecting oil drain pipe and nitrogen injection pipe

vii) Panel lighting

viii) Oil drain pipe extension of suitable sizes for connecting pipes to oil pit

23.3.2 CONTROL BOX

Control box shall be placed in the Master Control Room (MCR) for monitoring, automatic control and remote control. The rated control voltage of the control box shall be 220VDC / 110VDC (with converter). The control box shall have suitable indications, alarms, switches and push buttons for complete monitoring and control of the system.

23.3.3 TRANSFORMER CONSERVATOR ISOLATION VALVE

Transformer conservator isolation valve (TCIV) shall be fitted in the conservator pipe line between conservator and buchholz relay which shall operate for isolating the conservator during abnormal flow of oil due to rupture / explosion of tank or bursting of bushing. The valve shall not isolate conservator during normal flow of oil during filtration or filling or refilling. Locking plates shall be provided with handle for pad locking. It shall have proximity switch for remote alarm and indication glass window for visual inspection for physical checking of the status of valve. The TCIV shall be of the best quality and proven design as malfunctioning of TCIV could lead to serious consequences.

23.3.4 FIRE DETECTOR

Adequate number of fire detectors shall be fitted on top cover of the transformer and OLTC with brackets. Heat sensing temperature of the fire detectors shall be 141°C.

23.3.5 SIGNAL BOX

Signal box shall be mounted way from the transformer preferably near the

marshalling box for terminating the cables from TCIV & fire detectors and to further connection to control box at the MCR. The degree of protection of the signal box shall be IP 55 or better.

23.3.6 CABLES

The interconnecting cables shall be Fire Retardant Low Smoke (FRLS) type. Cables passing along the top of the transformer shall be Fire Survival type.

23.3.7 PIPES

Heavy duty pipe connecting the transformer tank for oil drain and for nitrogen injection shall be provided. Pipes, complete with supports, connections, flanges, bends and tees etc. shall be supplied along with the system.

23.3.8 OTHER ITEMS

(i) Doors and covers of all the panels (FEC, Control box, Signal box, etc.) shall beprovided with neoprene gaskets.

(ii) All the panels and piping system shall be painted with enameled paint.

23.4 PROTECTION PHILOSOPHY

23.4.1 The NIFPS shall have the operating modes and operate on receipt of corresponding activation signals.

23.4.1.1 Auto Mode

A. Fire Prevention

The system shall operate on receipt of all the following three signals.

(i) Differential relay trip

(ii) Operation of Buchholz relay (OR) Pressure Relief Device (OR) RapidPressure Rise Relay

(iii) Master trip (OR) Tripping of LV / HV circuit breaker in series

B. Fire Extinction

The system shall operate on receipt of all the following three signals.

(i) Operation of fire detector

(ii) Operation of Buchholz relay (OR) Pressure Relief Device (OR) Rapid Pressure Rise Relay (OR) Oil Surge Relay

(iii) Master trip (OR) Tripping of LV / HV circuit breaker in series

23.4.1.2 Remote Manual Mode

The system shall operate on receipt of both the following signals.

(i) Master trip (OR) Tripping of LV / HV circuit breaker in series

(ii) Operation of emergency operating switch on the control box

23.4.1.3 Local Manual Mode

In case the system fails in Auto Mode / Local Remote Mode (OR) Power Failure, the system can be operated manually from the Fire Extinguisher Cubicle.

23.4.2 On receipt of all required activating signals, the system shall drain pre-determined volume of oil from top of the tank through outlet valve to reduce tank pressure and simultaneously inject nitrogen gas at high pressure through inlet valves for stirring the oil and thus bringing the temperature of oil below flash point to extinguish the fire. Transformer conservator isolation valve shall blockthe flow of oil from conservator tank.

24. CONTROL AND RELAY PANEL

24.1 STANDARDS AND CODES

All equipment provided under Control and Relay Panel shall comply with latest editions and amendments of the relevant IEC standards and IS codes. In

particular, the C&R Panel shall comply with the following standards and codes.

Standard/Code	Description
IS 3231	Electrical relays for power systems protection
IEC 60255	Measuring relays and protection equipment
IEC 61850	Communication networks and systems for power utilityautomation
IEC 61131-3	Programmable controllers - Part 3: Programming languages
IS 9385	High voltage fuses
IS 9431	Indoor post insulators of organic material for systems with nominal voltages greater than 1000 V up to and including 300kV
IEC 60099-4	Surge arresters - Part 4: Metal-oxide surge arresters withoutgaps for A.C. systems
IS 3070-3	Lightning Arresters for Alternating Current Systems - Part 3:Metal Oxide Lightning Arresters Without Gaps
IEC 62052-11	Electricity metering equipment (A.C.) - General requirements,tests and test conditions - Part 11: Metering equipment
IEC 62053	Electricity metering equipment (A.C.) - Particular requirements
IS 14697	AC Static Transformer Operated Watthour and Var-hour Meters,Class 0.2S and 0.5S

24.2 CONSTRUCTION

24.2.1 The control and relay panel shall be free standing, floor mounted, simplex type, metal enclosed construction. The panel enclosure shall be made of CRCA steel sheet. The thickness of load bearing members shall be minimum 3 mm and that of non-load bearing members shall be minimum 2 mm.

24.2.2 All external surface shall be painted with two coats of epoxy-based paint of

colour shade RAL 7032. Internal surface shall be painted with epoxy enamel white paint. The minimum dry film thickness (DFT) shall be 100 micron.

24.2.3 Controls, indications, relays, meters and other instruments shall be flush mounted on the front of the panel. Door shall be provided at the rear of the panel. All doors and removable covers shall be provided with neoprene or synthetic rubber gasket.

24.2.4 The panel shall be dust, moisture and vermin proof with degree of protection not less than IP 4X as per IEC 60529.

24.2.5 Cable entry shall be through the bottom of the panel. Gland plate of thickness not less than 3 mm shall be provided.

24.3 RELAYS

24.3.1 All relays shall be microprocessor based numerical type. However, auxiliary relays can be static or electromechanical type. The relays shall be flush mounted on panel front with connections from the inside.

24.3.2 Auxiliary voltage of the relays shall be 110 VDC and the relays shall be capable of operating continuously between 80 – 120% of auxiliary voltage.

24.3.3 All numerical relays shall have adequate number of freely configurable, optically isolated, Binary Inputs (BI) and potential free Binary Outputs (BO). All I/O's shall have galvanic isolation. Analog inputs shall be protected against switching surges and harmonics.

24.3.4 All numerical relays shall have sufficient number of current and voltage inputs required for all the required protection functions.

24.3.5 The numerical relay shall provide choice of ANSI/IEC/IEEE relay characteristic curves with wide protection setting ranges through a minimum of two protection setting groups.

24.3.6 Making, breaking and continuous capacity of the relay contacts shall be adequate enough for the circuits in which they are used.

24.3.7 All numerical relays shall have provision for measurement and storage of electrical parameters such as voltage, current, frequency, active power,

reactive power etc.

24.3.8 The numerical relay shall be able to record faults and events in non-volatile memory.

i) Fault record – At least 5 recent faults including the protection function operated, operating phase(s), voltages and currents along with date and time stamp.

ii) Event record – At least 200 events with date and time stamp.

24.3.9 The numerical relay shall have trip circuit supervision facility to monitor the circuit breaker trip circuit both in pre-trip and post-trip conditions. The relay shall also be able to provide circuit breaker monitoring, CT and VT supervision.

24.3.10 The numerical relay shall have self-diagnostic feature with separate output contact for indication of any internal relay failure.

24.3.11 The numerical relay shall have two serial communication ports, one on front side for local communication with PC and another on rear side for remote communication with SCADA system as per IEC 61850.

24.3.12 The numerical relay shall have feature for time synchronization through the SCADA System / networking.

24.3.13 The numerical relay shall be provided with backlit alphanumeric LCD or LED to access protection settings, measurement parameters, fault and event records. Read and write access to protection settings shall be password protected.

24.3.14 Necessary software and hardware to up/down load the data to/from the relay from/to the PC shall also be provided.

24.4 PROTECTION SCHEME

The following protection schemes shall be implemented for the protection of power transformer and its feeder.

(i) Biased Differential Protection with Second Harmonic Restraint

(ii) Non-directional Over Current and Earth Fault Protection

(iii) Restricted Earth Fault Protection

(iv) Under Voltage and Over Voltage Protection

(v) Buchholz Alarm and Trip

(vi) OTI Alarm and Trip

(vii) WTI Alarm and Trip

(viii) PRV Trip

(ix) MOG Alarm

(x) OSR Trip

The above-mentioned protection schemes are indicative only. All the protection schemes required for safe and reliable operation of power transformer and the feeder shall be provided.

24.5 MEASURING INSTRUMENTS

24.5.1 All measuring instruments shall be enclosed in dust proof, moisture resistant cases and flush mounted on the panel.

24.5.2 Analog Ammeter and Voltmeter with selector switch shall be provided. Accuracy class shall be 0.5 or better. Instrument dial shall be with white scale, black pointer and black numerals.

24.5.3 Digital Multi-Function Meter (MFM) of accuracy class 0.2 or better shall be provided. It shall have communication capability for integration with SCADA. MFM shall be able to measure line & phase voltages, line & phase currents, active power, reactive power, apparent power, power factor and frequency.

24.6 CONTROL SWITCHES

All control switches shall be rotary operated type with adequate making, carrying and breaking current ratings. The control switches shall be pistol grip type, lockable with spring return to normal position. They shall be flush mounted on the panel with shrouded terminals.

24.7 INDICATIONS

All indicating lamps shall be flush mounted LED type with supply voltage of 110 VDC. Lamp covers shall preferably be screwed type and moulded from heat resisting material. Indicating lamps shall be provided for R, Y, B PT supply, Breaker ON & OFF, Auto trip, Spring charged, Trip circuit healthy, etc.

24.8 ANNUNCIATION

Flush mounted static type annunciator with sufficient number of windows to accommodate all trip and alarm signals shall be provided. Separate audible annunciation for alarm and trip shall be provided by means of buzzer and hooter. Visual annunciation shall be by flickering of facia. Push buttons for test, accept and reset shall also be provided.

24.9 EARTHING

24.9.1 An earth bus made of copper or aluminium shall be provided throughout the length of the panel and bolted to the framework of the panel. The earth bus shall have sufficient cross section to carry maximum fault current without exceeding the allowable temperature rise.

24.9.2 All non-current carrying conductors of the panel shall be connected to the earth bus. All joints to the earth bus shall be made through at least two bolts. Hinged doors shall be earthed through flexible earthing braid of adequate cross section. Suitable provision shall be provided at each end of the earth bus for connection with earth grid.

24.9.3 All metallic cases of relays, instruments and other panel mounted equipment shall be connected to earth bus by independent copper wires of size not less than 2.5 sq. mm with green colour insulation.

24.9.4 Instrument transformer secondary neutral point shall be earthed at one place only on the terminal block. Such earthing shall be made through links so that earthing of one circuit may be removed without disturbing the earthing of other circuits.

24.10 MIMIC DIAGRAM

Coloured mimic diagram made of metal or plastic with symbols to facilitate exact representation of the system shall be fixed on the front of control panel. Semaphore indicators shall be incorporated in the mimic diagram for indicating position of circuit breakers, isolators and earthing switches. The rated control voltage of semaphore indicator shall be 110 / 220 VDC.

24.11 WIRING AND TERMINAL BLOCKS

24.11.1 All internal wiring shall be done with 1100 V grade, 2.5 sq.mm. PVC insulated stranded flexible copper wire. For CT secondary circuits, 4 sq.mm copper wire shall be used.

24.11.2 Wire terminations shall be made with solderless crimping type tinned copper lugs, which shall firmly grip the conductor. Insulation sleeves shall be provided at all the wire terminations.

24.11.3 Printed identification ferrules, marked to correspond with panel wiring diagram shall be provided at both ends of each wire. The ferrules shall be firmly located on each wire so that they cannot move or turn freely on the wire. Wire identification shall be done in accordance with IS 11353.

24.11.4 The Contractor shall be solely responsible for the completeness and correctness of the internal wiring and for the proper functioning of the connected equipment.

24.11.5 All internal wiring to be connected to the external equipment shall terminate on terminal blocks. Terminal blocks shall be rated for 1100 V, 10 A and made of non-inflammable material.

24.11.6 CT and VT secondary circuits shall be terminated on stud type, non-disconnecting terminal blocks.

24.11.7 At least 10% spare terminals shall be provided on each panel and these spare terminals shall be distributed on all terminal blocks.

24.11.8 Screw driver operated stud type test terminal block shall be provided.

24.12 ACCESSORIES

(i) Thermostatically controlled space heater with switch for isolation

(ii) 240 V, 15 A industrial socket with ON/OFF switch

(iii) LED lamp controlled by door switch

24.13 WARRANTY

The control and relay panel unit shall be warranted for minimum of 18

months from the date of operational acceptance or 24 months from the date of dispatch whichever period may expire earlier against all material/ manufacturing defects and workmanship.

24.14 TESTING AND INSPECTION

24.14.1 Type Tests

The Contractor shall submit type test report of the panel for degree of protection as required by the Technical Specifications as per IEC 60529. The test should have been conducted by NABL accredited laboratory.

24.14.2 Routine Tests

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP) approved by the Employer.

25. 132 KV SWITCHYARD EQUIPMENT

132kV switchyard equipment along with bay shall be required for Bhiwani site only.

25.1 STANDARDS AND CODES

All equipment provided shall comply with latest editions and amendments of the relevant IEC standards and IS codes. In particular, the switchyard equipment shall comply with the following standards and codes.

Standard/Code	Description
IS/IEC 62271-100	High Voltage Switchgear and Control gear - Part 100: AC Circuit Breakers
IEC 60376, IS 13072	Specification of technical grade sulfur hexafluoride (SF6)for use in electrical equipment
IS/IEC 62271-102	High Voltage Switchgear and Control gear - Part 102: AC Disconnectors and Earthing Switches

IEC 61869	Instrument Transformers
IS 2099	Bushings for alternating voltages above 1000 Volts
IS 2544	Porcelain post insulators for systems with nominal voltagegreater than 1000 Volts
IS 335, IEC 60296	Insulating oil
IS/IEC 60034	Rotating electrical machines
IS 996	Single-phase AC industrial motors for general purpose
IS 3070, IEC 60099-4	Surge arresters - Part 4: Metal-oxide surge arresterswithout gaps for A.C. systems
Indian Electricity Act, CBIP manual, CEA rules and guidelines	

25.2 GENERAL TECHNICAL PARAMETERS

System Parameters	**Specification**
Highest system voltage	145 kV
Rated system voltage	132 kV
Rated frequency	50 Hz
Number of phases	3
One minute power frequency withstand voltage	275 kV (rms)
Full wave impulse withstand voltage (1.2 / 50 µs)	650 kV (peak)
Maximum Radio Interference Voltage between 0.5 MHz and 2.0 MHz	500 µV at 92 kV rms
Rated short-time withstand current	31.5 kA for 3 s
Rated peak withstand current	80 kAp
System neutral earthing	Effectively earthed
Minimum creepage distance	As per site pollution level
Minimum clearance (i) Phase to phase clearance (ii) Phase to earth clearance (iii) Sectional clearance (iv) Ground clearance	 1300 mm 1300 mm 4000 mm 4800 mm

25.3 SUPPLIER QUALIFICATION CRITERIA

Only PGCIL approved components shall be used for construction of 132 kV switchyard.

25.4 CIRCUIT BREAKER

25.4.1 TECHNICAL PARAMETERS

Parameters	**Specification**
Type	Outdoor SF6, single pressure
Operating duty cycle	O – 0.3sec – CO – 3min – CO
Rated break time	60 ms
Total break time	65 ms
Total closing time	Not more than 150 ms
Re-strike performance class	C2
Mechanical endurance class	M2
First pole to clear factor	1.3
Reclosing	Three phase high speed auto reclosing
Rated terminal load	Adequate to withstand 100 kg static load as well aswind, seismic and short circuit forces without impairing reliability or current carrying capacity
Noise level	Maximum 140 dB at 50 m distance from base of circuit breaker
Seismic level	0.5 g horizontal for the site location under Zone-Vas per IS 1893 0.3 g horizontal for the site location under other

	than Zone-V as per IS 1893
Auxiliary contacts	
No. of contacts	As required plus 10 NO and 10 NC contacts per pole as spare
Thermal rating	10 A at 220 V DC
Breaking capacity	2 A DC with circuit time constant not less than 20ms

25.4.2 DUTY REQUIREMENTS

25.4.2.1 The circuit breaker shall be shall be capable of performing their duties without opening resistors. The circuit breaker shall meet the duty requirements for any type of fault or fault location and shall be suitable for line charging and dropping when used on effectively grounded or ungrounded systems and perform make and break operations as per the stipulated duty cycles satisfactorily.

25.4.2.2 The circuit breaker shall be capable of breaking the steady and transient magnetizing current corresponding to power transformers of applicable rating. It shall be capable of breaking line charging currents as per IEC 62271-100 with a voltage factor of 1.4. The rated transient recovery voltage for terminal fault and short line faults shall be as per IEC 62271-100.

25.4.2.3 The total break time of the breaker shall not be exceeded under any duty conditions specified such as with the combined variation of the trip coil voltage, pneumatic/hydraulic pressure and arc extinguishing medium pressure, etc. While furnishing the proof of the total break time of complete circuit breaker, the effect of non-simultaneity between contacts within a pole or between poles shall be brought out to establish the guaranteed total break time. While furnishing particulars regarding the D.C. component of the circuit breaker, the Contractor shall note that IEC 62271-100 requires that this value should correspond to the guaranteed minimum opening time

under any condition of operation.

25.4.3 CONSTRUCTION

25.4.3.1 Circuit breakers shall be SF6 insulated, single pressure type. The design and construction of the circuit breaker shall be such that there is a minimum possibility of gas leakage and entry of moisture. There should not be any condensation of SF6 gas on the internal insulating surfaces of the circuit breaker.

25.4.3.2 Each pole shall form an enclosure filled with SF6 gas independent of two other poles and the SF6 density of each pole shall be monitored individually.

25.4.3.3 The SF6 gas density monitor shall be adequately temperature compensated to model the density changes due to variations in ambient temperature within the body of circuit breaker as a whole. It shall be possible to dismantle the monitor without removal of gas. Temperature compensated SF6 pressure gauge shall be provided which will be visible from ground level.

25.4.3.4 Sufficient SF6 gas shall be supplied to fill all the circuit breakers installed plus an additional 20% of the quantity as spare.

25.4.3.5 All making and breaking contacts shall be sealed and free from atmospheric effect. In the event of leakage of extinguishing medium to a value, which cannot withstand the dielectric stresses specified in the open position, the contacts shall preferably self-close. Main contacts shall be easily accessible for inspection and replacement. If there are no separately mounted arcing contacts, then the main contacts shall be easily accessible for inspection and replacement. Main contacts shall have ample area and contact pressure for carrying the rated current under all conditions.

25.4.3.6 All the three poles of the breaker shall be linked together either electrically/pneumatically or electro hydraulically.

25.4.3.7 Circuit breakers shall be provided with two (2) independent trip coils, suitable for trip circuit supervision. The trip circuit supervision relay would also be provided. Necessary terminals shall be provided in the central control cabinet of the circuit breaker.

25.4.4 OPERATING MECHANISM AND CONTROL

25.4.4.1 Circuit breaker shall be operated by pneumatic mechanism or electrically spring charged mechanism or electro-hydraulic mechanism or a combination of these. It shall be gang operated for 3-phase reclosing operation.

25.4.4.2 The pneumatically operated mechanism shall offer unit compressor with each circuit breaker with the breaker local air receivers having a capacity for two 'CO' operations of the breaker at the lowest pressure for reclose duty without refilling.

25.4.4.3 The spring-operated mechanism shall be complete with motor, opening spring & closing spring with limit switch for automatic charging and other necessary accessories to make the mechanism a complete operating unit. As long as power is available to the motor, a continuous sequence of closing and opening operations shall be possible. The motor shall have adequate thermal rating for this duty. After failure of power supply to the motor, one close-open operation shall be possible with the energy contained in the operating mechanism. Motor ratings shall be such that it requires not more than 30 seconds for fully charging the closing spring.

25.4.4.4 The hydraulic mechanism shall be suitable for at least two close open operations after failure of ac supply to the motor starting at pressure equal to lowest pressure of auto-reclose duty. All hydraulic joints shall have no oil leakage under the site conditions and joints shall be tested at factory against oil leakage at a minimum of 1.5 times maximum working pressure.

25.5 DISCONNECTOR

25.5.1 Technical Parameters

System Parameters	**Specification**
Service	Outdoor
Type	Gang operated, Double break type
Rated short-time withstand current for isolator & earth switch	31.5 kA for 3s

Rated peak withstand current for isolator & earth switch	80 kAp
Operating Mechanism	AC / DC / Universal motor operated
Maximum operating time	12 s
Control Voltage	110 / 220 V DC
Auxiliary contacts	
No. of contacts for isolator	As required plus 8 NO and 8 NC contacts per pole as spare
No. of contacts for earth switch	Total 6 NO and 6 NC
Thermal rating	10 A at 220 V DC
Breaking capacity	2 A DC with circuit time constant not lessthan 20 ms
Mechanical endurance class a) Isolator b) Earth switch	 M2 M0

25.5.2 DUTY REQUIREMENTS

25.5.2.1 Isolators and earth switches shall be capable of withstanding the dynamic and thermal effects of the maximum possible short circuit current of the system in their closed position. They shall be constructed such that they do not open under influence of short circuit current and wind pressure together.

25.5.2.2 The earth switches, wherever provided, shall be interlocked so that the earth switches can be operated only when the isolator is open and vice versa. In addition to the constructional interlock, isolator and earth switches shall have provision to prevent their electrical and manual operation unless the associated and other interlocking conditions are met. All these interlocks shall be of failsafe type. Suitable individual interlocking coil arrangements shall be provided. The interlocking coil shall be suitable for continuous operation from DC supply and within stipulated variation range. The interlock coil shall be provided with adequate contacts for facilitating permissive logic for DC control

scheme of the isolator as well as for AC circuit of the motor to prevent opening or closing of isolators when the interlocking coil is not energised.

25.5.2.3 The earthing switches shall be capable of discharging trapped charges of the associated lines. Isolators and earth switches shall be able to bear on the terminals the total forces including wind loading and electrodynamic forces on the attached conductor without impairing reliability or current carrying capacity.

25.5.2.4 The isolator shall be capable for making/breaking normal currents when no significant change in voltage occurs across the terminals of each pole of the isolator on account of making/breaking operation.

25.5.3 CONSTRUCTION

25.5.3.1 CONTACTS

(i) The contacts shall be self-aligning and self-cleaning type and shall be so designed that binding cannot occur after remaining in closed position for prolonged period in a heavily polluted atmosphere.

(ii) No undue wear or scuffing shall be evident during the mechanical endurance tests. Contacts and spring shall be designed so that readjustments in contact pressure shall not be necessary throughout the life of the isolator or earthing switch. Each contact or pair of contacts shall be independently sprung so that full pressure is maintained on all contacts at all time.

(iii) Contact springs shall not carry any current and shall not lose their characteristics due to heating effects.

(iv) The moving contact of double break isolator shall preferably be turn-and-twist type or other suitable type of locking arrangement to ensure adequate contact pressure.

(v) Flexible braided copper, where used, shall have corrosion resistant coating such as tinning or silvering.

25.5.3.2 BASE

Each single pole of the isolator shall be provided with a complete galvanised steel base provided with holes and designed for mounting on a standard supporting structure.

25.5.3.3 BLADES

(i) All metal parts shall be of non-rusting and non-corroding material. All current carrying parts shall be made from high conductivity electrolytic copper/aluminium. Bolts, screws and pins shall be provided with lock washers. Keys or equivalent locking facilities if provided on current carrying parts shall be made of copper silicon alloy or stainless steel or equivalent. The bolts or pins used in current carrying parts shall be made of non-corroding material. Ferrous parts, other than stainless steel shall not be used in close proximity of main current path. All ferrous castings, if used elsewhere shall be made of malleable cast iron or cast-steel. No grey iron shall be used in the manufacture of any part of the isolator.

(ii) The live parts shall be designed to eliminate sharp joints, edges and other corona producing surfaces. Where this is impracticable, adequate corona rings shall be provided. Corona shields are not acceptable. Corona rings shall be made up of aluminum/aluminum alloy.

(iii) Isolators and earthing switches including their operating parts shall be such that they cannot be dislodged from their open or closed positions by short circuit forces, gravity, wind pressure, vibrations, shocks, or accidental touching of the connecting rods of the operating mechanism.

(iv) The isolator and earth switch shall be designed such that no lubrication of any part is required except at very infrequent intervals. i.e., after every 1000 operations or after 5 years whichever is earlier.

25.5.3.4 INSULATOR

(i) The insulator shall conform to IS / IEC 60168 and IS 16683 / IEC TS 60815.

(ii) In addition to all type, routine and acceptance tests, as per IS / IEC 60168, the following additional routine/ acceptance tests shall also be carried out.

(a) Bending load test in four directions at 50% of minimum bending loadguaranteed on all insulators, as routine test

(b) Bending load test in four directions at 100% of minimum bending load guaranteed as a sample test on each lot

(c) Torsional test on sample insulator of a lot

(d) Ultrasonic test as a routine test

(iii) The porcelain of the insulator shall have minimum cantilever strength of 600 kg.

(iv) Pressure due to the contact shall not be transferred to the insulators after the main blades are fully closed.

25.5.3.5 EARTHING SWITCHES

(i) Where earthing switches are specified, these shall include the complete operating mechanism and auxiliary contacts. The earthing switches shall form an integral part of the isolator and shall be mounted on the base frame of the isolator.

(ii) Earthing switches shall only be locally operated.

(iii) Each earth switch shall be provided with flexible copper/aluminum braids for connection to earth terminal. These braids shall have the same short time current carrying capacity as the earth blade. The transfer of fault current through swivel connection will not be accepted.

25.5.4 OPERATING MECHANISM AND CONTROL

25.5.4.1 The Contractor shall offer motor operated switches having padlock arrangementfor both ON and OFF positions.

25.5.4.2 Limit switches for control shall be fitted on the isolator / earth switch shaft within the cabinet to sense the open and close positions of the isolators and

earth switches.

25.5.4.3 It shall not be possible, after final adjustment has been made, for any part of the mechanism to be displaced at any point in the travel sufficient enough to allow improper functioning of the isolator when the isolator is opened or closed at any speed.

25.5.4.4 Control cabinet / operating mechanism box shall conform to requirements stipulated elsewhere in the document and IS/IEC 61439 as applicable.

25.5.5 OPERATION

25.5.5.1 Isolator shall be electrically/mechanically gang operated for main blades and earth switches. The operation of all the three poles shall be well synchronized and interlocked.

25.5.5.2 The design shall be such as to provide maximum reliability under all service conditions. All operating linkages carrying mechanical loads shall be designed for negligible deflection. The length of inter insulator and interpole operating rods shall be capable of adjustments.

25.5.5.3 The isolator and earth switches shall be provided with ‘dead centre mechanism’ to prevent accidental opening by wind, vibration, short circuit forces or movement of the support structures.

25.5.5.4 The design of linkages and gears be such so as to allow one man to operate the handle with ease for isolator and earth.

25.6 SURGE ARRESTER

25.6.1 TECHNICAL PARAMETERS

Parameter	**Specification**
Arrester Classification	Station Medium (SM)
Nominal discharge current (8/20 µs)	10 kA
Repetitive charge transfer rating	1.6 coulomb

Rated thermal energy rating	7 kJ/kV
Rated arrester voltage	120 kV
Continuous operating voltage at 50°C	102 kV
Maximum Residual Voltage (i) At 30/60 µs, 1 kA current (ii) At 8/20 µs, 5 kA current At 8/20 µs, 10 kA current	 280 kVp 310 kVp 330 kVp
High-current short duration test value (4/10 µs)	100 kAp
Current for pressure relief test	40 kA
Partial discharge at 1.05 times the continuous operating voltage	≤ 10 pC

25.6.2 DUTY REQUIREMENTS

25.6.2.1 The Surge Arresters shall be capable of discharging over-voltages occurring due to switching of unloaded transformers, reactors and long lines.

25.6.2.2 The reference current of the arresters shall be high enough to eliminate the influence of grading and stray capacitance on the measured reference voltage.

25.6.2.3 The Surge Arresters shall be capable of withstanding meteorological and short circuit forces under site conditions.

25.6.2.4 The SAs shall protect power transformers, circuit breakers, disconnecting switches, instrument transformers, etc. with insulation levels specified in this specification.

25.6.3 CONSTRUCTION

25.6.3.1 Each surge arrester shall be hermetically sealed single-phase unit. The non-linear blocks shall be made of sintered metal oxide material. The surge

arrester construction shall be robust with excellent mechanical and electrical properties.

25.6.3.2 Surge Arresters shall be fitted with pressure relief devices and arc diverting ports suitable for preventing shattering of polymer housing and to provide path for flow of rated fault current in the event of SA failure.

25.6.3.3 Outer insulator of surge arrester shall be made of porcelain/polymer. The outer insulator housing shall be so coordinated that external flashover will not occur due to application of any impulse or switching surge voltage up to the maximum design value for arrester. Arresters shall not fail due to insulator contamination.

25.6.3.4 Seals shall be provided in such a way that they are always effectively maintained even when discharging rated lightning current.

25.6.3.5 The cantilever strength of the insulator shall be minimum 150 kg.

25.6.3.6 The following details shall be furnished for quality checks.

(i) The heat treatment cycle details along with necessary quality checks used forindividual blocks and insulation layer formed across each block.

(ii) Metalizing coating thickness for reduced resistance between adjacent discs.

25.6.4 FITTINGS AND ACCESSORIES

25.6.4.1 Surge arrester shall be complete with insulating base having provision for mounting to structure.

25.6.4.2 Grading/corona rings shall be provided on each surge arrester unit, as required.

25.6.4.3 The end fittings shall be made of corrosion proof material and preferably be nonmagnetic.

25.6.4.4 Self-contained discharge counters, suitably enclosed for outdoor use and requiring no auxiliary or battery supply for operation shall be provided for each single pole unit along with necessary connection arrangement. Suitable leakage current meters shall also be provided in the same enclosure. The

reading of ammeter and counter shall be visible through an inspection glass panel to maintenance personnel standing on ground. The terminals shall be robust and of adequate size and shall be so located that incoming and outgoing connections are made with minimum possible bends. The surge counter shall be provided with a potential free contact rated for 220 V DC which shall close whenever a surge is recorded by the surge monitor. Necessary arrangement shall be provided for extending the contact information to Substation Automation System/RTU.

25.7 INSTRUMENT TRANSFORMER

25.7.1 TECHNICAL PARAMETERS

Parameter	**Specification**
Current Transformer	
Accuracy class	Metering – 0.2S Protection – PS / 5P20
Rated VA burden	As per requirement
Insulation class	Class E
One minute power frequency withstand voltage between secondary terminals & earth	5 kV
Rated short time thermal withstand current	31.5 kA for 1 s
Rated dynamic current	80 kAp
Partial discharge level	10 pico Coulomb (max)
No. of terminals	All terminals of control circuits wired up tomarshalling box plus 20% spare
Capacitive Voltage Transformer	
Accuracy class	Metering – 0.2 Protection – PS / 3P
Rated VA burden	As per requirement

Insulation class	Class E
Standard reference range of frequencies for which the accuracies are valid	96% to 102% for protection and 99% to 101% for measurement
High frequency capacitance forentire carrier frequency range	Within 80% to 150% of rated capacitance
Equivalent series resistance overentire carrier frequency range	< 40 ohm
One minute power frequency withstand voltage between secondary terminals & earth	
(i) Between LV (HF) terminal andearth terminal	10 kV for exposed terminals 4 kV for terminals enclosed in a weatherproof box
(ii) For secondary winding	3 kV
Partial discharge level	10 pico Coulomb (max)
Rated voltage factor	1.2 continuous and 1.5 for 30 sec.
No. of terminals	All terminals of control circuits wired up tomarshalling box plus 20% spare

25.7.2 GENERAL REQUIREMENTS

25.7.2.1 Instrument transformers shall be hermetically sealed single-phase units, oil immersed, self-cooled suitable for outdoor installations and shall be supplied with common marshalling box for a set of three single phase units.

25.7.2.2 The external surface of instrument transformer, if made of steel, shall be hot dip galvanized or painted with colour shade as decided by the Employer during detailed engineering.

25.7.2.3 Insulating oil to be used for instrument transformers shall be of EHV grade and shall conform to IS 335 / IEC-60296. Non–PCB based synthetic insulating oil conforming to IEC 60867 shall be used in the capacitor units of CVT.

25.7.2.4 Polarity marks shall indelibly be marked on each instrument transformer and at the lead terminals at the associated terminal block.

25.7.2.5 The insulators shall have cantilever strength of more than 350 kg.

25.7.2.6 Marshaling box shall conform to all requirements given elsewhere in the document. The wiring diagram for the interconnection of three phase instrument transformer shall be pasted inside the box. Terminal blocks in the marshaling box shall have facility for star/delta formation, short circuiting and grounding of secondary terminals. The box shall have enough terminals to wire all control circuits plus 20 spare terminals.

25.7.3 CURRENT TRANSFORMER

25.7.3.1 Current transformer shall have single primary of either ring type or hair pin type or bar type. Wound type primary is acceptable only for metering CTs of ratio less than 400/1. In case of inverted type/live tank CT, the following requirements shall be met.

(i) The secondaries shall be totally encased in metallic shielding providing a uniform equipotential surface for even electric field distribution.

(ii) The lowest part of the insulation assembly shall be properly secured to avoid any risk of damage due to transportation stresses.

(iii) The upper part of insulation assembly resting on primary bar shall be properly secured to avoid any damage during transportation due to relative movement between insulation assembly & top dome.

(iv) The insulator shall be one piece without any metallic flange joint.

25.7.3.2 Core lamination shall be of cold rolled grain-oriented silicon steel or other equivalent alloys. The cores shall produce undistorted secondary current under transient conditions at all ratios with specified parameters.

25.7.3.3 The CT shall be provided with oil filling plug, drain plug, and oil sight glass which should be clearly visible to maintenance personnel standing on ground.

25.7.3.4 The secondary terminals of CT shall be terminated to suitable number of stud type non-disconnecting and disconnecting terminal blocks as required inside

the terminal box of degree of protection IP 55 at the bottom of CT.

25.7.3.5 Different ratios shall be achieved by secondary taps only; primary reconnection shall not be accepted.

25.7.3.6 The Instrument Security Factor (ISF) at all ratios shall be less than five (5) for metering core. If any auxiliary CTs/reactors are used, then all parameters specified shall be met treating auxiliary CTs as an integral part of the CT. The auxiliary CTs/reactors shall preferably be in-built construction of the CT. In case these are to be mounted separately, these shall be mounted in the central marshalling box suitably wired up to the terminal blocks.

25.7.3.7 Current transformers shall be suitable for high speed auto reclosing.

25.7.4 CAPACITOR VOLTAGE TRANSFORMER

25.7.4.1 Capacitor Voltage Transformer shall consist of a capacitor divider and an electromagnetic unit housed in independent, non-oil communicating hermitically sealed compartments.

25.7.4.2 The capacitor divider shall consist of primary and secondary capacitance housed in high quality porcelain insulators filled with oil. The electromagnetic unit shall comprise of compensating reactor, intermediate transformer, protective and damping devices.

25.7.4.3 Suitable damping device shall be permanently connected to one of the secondary windings and shall be capable of suppressing ferro-resonance oscillations.

25.7.4.4 All the secondary windings of the CVT shall be protected by HRC cartridge type fuses or MCBs. In addition, fuses/MCBs shall also be provided for protection and metering windings for connection to fuse monitoring scheme.

25.7.4.5 The secondary terminals of the CVT shall be terminated to stud type non-disconnecting terminal blocks via fuses/MCBs inside the terminal box of degree of protection IP 55. It should be ensured that access to secondary terminals is without any danger of access to high voltage circuit.

25.7.4.6 CVTs shall be suitable for High Frequency (HF) coupling required for Power

Line Carrier Communication (PLCC). Carrier signals must be prevented from flowing into EMU circuit by means of RF choke/reactor over the entire frequency range of 40 to 500 kHz. HF terminal shall be brought out through a suitable bushing and shall be easily accessible for connection to the coupling filters of the carrier communication equipment. Further, earthing link with fastener to be provided for HF terminal.

25.7.4.7 A protective surge arrester/spark gap shall preferably be provided to prevent break down of insulation by incoming surges and to limit abnormal rise of terminal voltage of shunt capacitor, tuning reactor, RF choke, etc. due to short circuit in transformer secondary. The details of this arrangement (or alternative arrangement) shall be furnished by Contractor for Employer's review.

25.7.4.8 The accuracy of metering core shall be maintained through the entire burden range up to rated value without any adjustments during operations.

25.7.4.9 The protection cores shall not saturate at about 1.5 times the rated voltage for a minimum duration of 30s.

25.8 WARRANTY

All switchyard equipment shall be warranted for minimum of 30 months from the date of operational acceptance or 36 months from the date of dispatch whichever period may expire earlier against all material/ manufacturing defects and workmanship.

25.9 TESTING AND INSPECTION

25.9.1 TYPE TESTS

All switchyard equipment shall be of type tested design. Type test reports as per the relevant IEC/IS standards shall be submitted during detailed engineering. The tests should have been conducted on the similar equipment by NABL accredited laboratory. In case the contractor is not able to submit the test reports during detailed engineering, the contractor shall submit the reports of type/special tests either conducted by NABL accredited laboratory or

witnessed by Purchaser.

25.9.2 ROUTINE TESTS

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP) approved by the Employer.

26. POWER EVACUATION SYSTEM

26.1 The Contractor has to do the power evacuation and integration to and with the designated substation via either overhead transmission line or underground cables at specified grid voltage with all necessary infrastructure such as protection switchgears and metering systems as per the requirement of the DISCOM/STU/BBMB/CTU.

26.2 The Contractor shall get the route approval from the Purchaser prior to start of the construction. Any changes in the route or scheme due to ROW issues at any point of the time prior to commissioning shall be complied without any additional cost to the Purchaser.

26.3 The ROW for the TL/UG cable shall be obtained prior to the construction of the line from the concerned authorities.

26.4 While laying overhead line / underground cable, existing lines / cables shall not be disturbed. In case any damage is caused to the existing lines / cables, the Contractor shall repair / rectify the line / cable at his own cost.

26.5 OVERHEAD TRANSMISSION LINE

In case the power evacuation is planned with overhead transmission line for plant external evacuation, the design of tower and its accessories shall be as per the BBMB/DISCOM/STU/CTU requirement and the design shall be submitted to Purchaser for approval/ accord.

26.6 UNDERGROUND CABLE

In case the power evacuation is planned with underground cable for plant internal evacuation, the cable shall be approved by the Purchaser. However, in case of external power evacuation, the evacuation plan shall be as per BBMB/DISCOM/STU/CTU requirement and the same shall be submitted to Purchaser for approval/ accord.

26.7 INSULATORS

26.7.1 Overhead Line shall have Required Voltage level Silicone Polymeric Composite insulators suitable for operation in the Site conditions and shall be designed to meet the high quality, safety and reliability capable of withstanding a wide range of environmental conditions.

26.7.2 The Polymeric Insulators shall consist of three parts, at least two of which are insulating parts: (a) Core – the internal insulating part (b) Housing – the external insulating part (c) Metal end fittings (dimensions as per IEC 60120 / IS 2486-2).

26.7.3 **TESTS**

The Contractor shall furnish detailed type test reports as per IEC 61109 of the offered composite insulators from an NABL approved laboratory during detailed engineering. At least following type tests shall be conducted on a suitable number of individual insulator units, components, materials or complete strings.

i) Dry lightning impulse withstand voltage test
ii) Wet power frequency test
iii) Mechanical load-time test
iv) Radio interference test
v) Recovery of Hydrophobicity test
vi) Chemical composition test for silicon content
vii) Brittle fracture resistance test

These type tests should have been carried out within five years prior to the date of opening of the tender. The following routine tests (as per IEC 61109) shall be applicable.

(i) Identification of marking

(ii) Visual Inspection

(iii) Mechanical routine test

NOTE: - The Evacuation of Power at Bhiwani & Hisar Sub-stations shall be at 132kV and 33kV voltage level respectively. However the intermediate voltages of equipments like IDT, Switchgears shall be as per the design and engineering submitted by the bidder and approved by the purchaser.

C. CIVIL WORKS

1 GENERAL REQUIREMENT

1.1 This section of Technical Specifications describes detailed technical and functional requirements of all civil, structural & mechanical included in the scope.

1.2 This includes design, supply and installation of Galvanized 132 kV Transmission Line towers, Tower extensions & accessories and 11 kV & 33 kV transmission poles & accessories (as applicable) which shall be designed following latest guidelines of respective SEB (State electricity board)/BBMB and got approved from SEB/STU/CTU/BBMB before execution. In absence of SEB/STU/CTU/BBMB guidelines, REC (Rural Electrification Corporation) standards shall be followed. Poles at corner with angle > 10° shall be provided with 4- pole structure or lattice tower. Use of Pre-stressed cement concrete spun poles is not acceptable. Approved copies of these designs & drawings shall be submitted to the Purchaser for reference and record.

1.3 STANDARDS & CODES

1.3.1 All design and construction of civil works shall conform to relevant Indian standards such as BIS, IRC, MORTH, NBC, CPWD Specifications etc.

1.3.2 Design of steel structures shall conform to IS: 800, 801 or 802 as applicable. Design of concrete structures shall conform to IS: 456. For design of liquid retaining structure IS: 3370 shall be followed.

1.3.3 The design calculations for MMS, RCC structure, Steel structure, Foundation system, Road work, Drainage work, etc. shall be submitted for prior approval of Purchaser before commencement of construction.

1.3.4 As per project requirements, the Purchaser may ask for approval of all civil designs and drawings by a Chartered Civil/ Structural Engineer/reputed Government institution.

1.3.5 The following procedure has to be followed for assessment and approval of designs, specifications and drawings during the course of the project: The Contractor shall submit to the Company/ Consultant the documents in hard copy and soft copy both with proper reference and drawing numbers. The respective documents for selection, supply, installation, erection, commissioning of equipment / structures have to be submitted at least 15 days in advance to the planned start of the activity as per the Contractor's project schedule. The Contractor shall submit documents as required for this project according to his design and specifications. The Company / Consultant (on behalf of the Company) will assess, review and approve the documents within 15 days of submission of documents; and only after the approval the Contractor shall release the documents on site for execution. The documents shall be revised by the Contractor as per instructions / comments given by the Company / Consultant (on behalf of the Company) if required, prior to execution. Subsequent revisions and the final version of the documents shall also be submitted in hard and soft copy to the Company and the Consultant.

i. The Contractor has to take into account the above-mentioned process of revisions (if required) and adjust the preparation and delivery of the documents such that the overall planned project schedule is not affected. The Contractor has to submit all drawings, which are related to plant for approval and the Contractor, shall not claim any drawing as their intellectual property. Drawing which is developed for project will be the intellectual

property of the Company.

ii. The Contractor shall submit a comprehensive project management schedule in the form of a Gantt chart, CPM/PERT chart and shall be liable for abiding by the schedule. The submitted copy shall be compatible to open in either MS project or Primavera & MS Excel.

iii. The Contractor shall submit a comprehensive maintenance schedule for operation and maintenance of the photovoltaic power plant along with checklists before commencement of work on site and shall be liable for abiding by the schedule. All construction, operation and maintenance procedures shall be carried out through appropriate relevant standards, regulations and labor laws.

1.4 The design calculations shall be supplemented with a neat sketch showing the structure geometry, node and member nos., lengths of various typical members, support points and type of supports, types of materials & type of sections with properties considered in analysis & design. The report shall also include back-up calculations for various loads adopted in design, brief write-up on primary load cases and design load combinations considered and conclusions on design results (with supporting sketches) for easy reference and clarity.

1.5 The methodology for construction of MMS and its foundations, Road & drainage worksshall also be submitted for prior approval of Purchaser before start of these works.

2 TOPOGRAPHICAL SURVEY

2.1 The contractor shall be responsible for detailed Topographical Survey of the proposed project site. The work shall be carried out through an agency with relevant experienceand qualified survey team.

2.2 BBMB will show the proposed project site physically to bidder, necessary required survey work for co-ordinate of site will be carried out by bidder and accordingly final plot layout drawing shall be submitted to BBMB for further approval. Topographical survey shall have to be done by the Bidder for the proposed site at 20m x 20m grid interval with the help of Total Station. All necessary Reduced

Levels (RL) as entered in the Field Book/Soft Copy have to be submitted along with pre contour layout of the total site. The formation levels of the proposed solar power plant have to be fixed with reference to High Flood Level of the proposed site. The ground level and plinth level of structures shall be fixed taking into consideration on the highest flood level and surrounding ground profiles.

2.3 The record of measurement of all Reduced Levels (RL) shall be submitted in digital format, (in x, y z coordinate system) along with preliminary contour plan of the site, for Engineer's review before submission of final contour map. The contour interval shall be as required for proper representation of the topography however it shall not be more than 0.5m. The Contractor shall submit survey maps of the site in 1:5,000 scale indicating grid lines and contour lines, demarcating all permanent features like roads, buildings, power lines, natural streams, trees etc. Present use of the site i.e. existing drainage pattern of the site, possibility of water logging and high flood level of the area shall also be captured in the document. The project plot boundary with coordinates of all corner points along with coordinate grid of 20m x 20m interval shall be marked on the contourmap.

3 GEOTECHNICAL INVESTIGATIONS

3.1 Detailed Geotechnical investigations are in the scope of the bidder who is advised to inspect the site and study the nature of the soil before the submission of the bid.

3.2 The contractor shall be responsible for detailed Geotechnical investigations at the proposed project site for the purpose of foundation design of various structures. The investigation work shall be carried out through any Govt. approved/ NABL accredited agency. The contractor shall submit the credentials of the proposed agency along with relevant certificates in support thereof for verification/ approval by the Purchaser. These reports shall be furnished to the Company prior to commencing work.

3.3 The scope of work includes execution of complete soil exploration including boring and drilling with rotary drilling rig, standard penetration test (SPT), collecting disturbed (DS) and undisturbed samples (UDS), electrical resistivity tests (ERT), conducting laboratory tests on collected samples of soil etc and preparation and

submission of report.

3.4 The field investigations shall mainly include drilling of min. 5 m deep BHs (with min. 2 no. of boreholes to be 10m deep), conducting SPT and collecting Disturbed (DS) and Undisturbed samples (UDS), There shall be minimum 1 nos. of BH per 10 acres of the area.

3.5 The proposed Geotechnical investigation plan indicating proposed locations of TPs, BHs & ERT shall be submitted to the Purchaser for review and approval before start of work.

3.6 After completion of field and laboratory work, the contractor shall submit a Geotechnical Investigation Report for Purchaser's approval. All bore log details and lab test results shall be presented in the report as per provisions of relevant BIS standards indicating BH coordinates, Existing GL, Depth of water table, Method of drilling etc. The report shall include a Map showing the locations of various field tests including coordinates, calculations and recommendations for foundation type and safe bearing capacity (SBC) and Open installations, Switch Yard structures & Sub-Station (as applicable), Transformer foundation, HT lines (as applicable), MMS foundation etc. corresponding to settlement of 25mm.

3.7 Plinth for Open installations (MCR, ICR etc.), Transformer yard, Switchyard and Sub-station area shall have levelled ground.

4 OTHER INVESTIGATIONS

4.1 The contractor shall also obtain and study other input data at proposed project site fordesign of the project from metrological department/ local govt. authorities. This shall include data related to Rainfall, Maximum & Minimum ambient Temperature, Humidity,HFL etc.

4.2 The contractor shall carry out Shadow Analysis at proposed site and accordingly design strings and array layout with optimum use of space, material and man power. The contractor shall submit all the details/ design to the Purchaser for review/ approval.

4.3 The contractor shall use coarse and fine aggregates from the Govt. approved quarries. The concrete mix shall be designed for each source of cement and aggregates as per provisions of IS:10262 and confirmed through 28 days compressive strength of concrete trial mix samples. The concrete mixdesign shall

be carried out through NABL accredited Laboratory or any Govt. agency. In case the contractor proposes to use RMC, the same shall conform to IS: 4926. The Contractor shall submit the Concrete mix design proposed tobe used by the RMC for review and approval by the Purchaser. (Reports of periodic quality tests for the supply concrete batch shall be maintained by the RMC supplier as per approved Quality Plan and the same shall be submitted to the Purchaser for review and record).

5 AREA GRADING AND LAND DEVELOPMENT

5.1 The Finished Grade Level (FGL) of the proposed plant shall be fixed with reference to the highest flood level (HFL) and surrounding ground profile at proposed site to avoid flooding of plant site. The data regarding HFL at proposed site shall be obtained from the meteorological department by the contractor. Module mounting structure foundation or any other pedestal shall be min. 200mm above FGL. Top of transformer foundation pedestal shall be min, 500mm above the FGL.

5.2 A detailed drawing for site levelling and grading (if necessary) shall be submitted by the contractor before commencement of work. It is envisaged that the MMS are installed on natural/ existing ground without any levelling or grading of the area. Contractor shall accordingly consider the effect of the existing ground slope on the design of MMS structure as specified elsewhere in the specifications.

5.3 The contractor is responsible for making the site ready and easily approachable by clearing bushes, felling of trees (mandatory permissions/ licenses/ statutory clearances from competent authorities if required for cutting of trees, disposal of waste material etc. shall be obtained by the contractor), cutting, filling with selected excavated earth or borrowed earth including identifying borrow areas. The filling for levelling/ reclaiming the ground/ area shall be done in layers not more than 150mm of compacted thickness in case of cohesive (clayey) soils and 250mm compacted thickness in case of granular (sandy) soils with compaction up to 95% (of modified proctor density) and 80% (of relative density) respectively. The slope at edge of graded areas shall not be steeper than 1:1.5 (1 Vertical: 1.5 Horizontal) in cutting and 1:2 (1 Vertical: 2 Horizontal) in filling.

5.4 It shall be ensured that the land grading and levelling is done properly to ensure for free flow of surface run-off and the grade levels shall be fixed with respect to high flood level at site, drainage pattern and system requirements. It shall be ensured that the land is used optimally to have maximum solar power generation considering full utilization of the plot areas. It is advisable to follow the natural flow of water at the ground as far as possible for drainage design. During execution of work if any hidden masonry/concrete foundation/pipeline etc. found then agency has to execute/ remove/reroute the same without any financial implication.

6 ROADS

6.1 Suitable approach road (as applicable) from the existing BBMB roads, Internal roads, etc. shall be provided for safe and easy transportation of men, material and equipment during construction and maintenance.

6.2 The internal access road(s) connecting MCR and open Installations shall be of 3.0m wide carriage way with 0.5m wide shoulders on either side. The top of road (TOR) elevation shall be minimum 200 mm above FGL to avoid flooding of roads during rains. The concrete road may be designed for expansion and contraction joints as per relevant codal provision.

6.3 However, following minimum road section details shall be followed:

i) Topping: 75 mm thick M20 grade concrete.

ii) Base course of 125 mm thick PCC 1:3:6.

iii) Compacted subgrade as per CPWD specifications and relevant codes.

iv) Shoulders: 150mm compacted thick, of suitable earth.

v) Contraction and expansion joints also be provided.

6.4 Drain, cable or any other crossing shall be provided with RCC box or precast concrete pipe culvert. The culvert design shall conform to relevant IRC standard. The pipes for road culverts shall be of minimum class NP3 conforming to IS 458 with min. soil cover of 750mm above the pipe. In case of soil cushion less than 750mm the pipe shall be provided with 100 mm thick M20 reinforced concrete encasement with 10 dia. reinforcement rods @ 150mm c/c both ways. However, the water supply pipe for module cleaning and service/ drinking water shall be

routed through Medium class GI steel pipe of required dia. conforming to IS: 1161.

6.5 Minimum dia. of casing pipe to be used at any facility like electric cable, water pipe line etc. shall be 150mm.

6.6 Maintenance pathways of min. 1.0m width shall be provided between SPV arrays for easy movement of maintenance staff, tools, equipment and machinery, washing of modules etc. The pathway area shall be generally levelled and well compacted manually/ mechanically to avoid accumulation of water in the region and allowing its free flow to keep the area devoid of mud/ sludge.

6.7 The design and drawings for approach road, all internal roads and culverts shall be submitted to BBMB for approval before execution.

7 SURFACE/ AREA DRAINAGE

7.1 The contractor shall design and construct storm water drainage network for smooth disposal of storm water from the plant to the nearest available drainage outlet as per relevant codes and guidelines. The storm water drainage system shall be designed and planned to ensure no water stagnation in the plant. The structural design of drains shall be as per provisions of relevant BIS standards and good industry practice.

7.2 The plant drainage system shall be designed for the design rainfall intensity obtained from concerned department. The drainage scheme shall be designed considering the plant plot area and the surrounding catchment area contributing to the plant area drainage as per the topography.

7.3 The storm water drainage system shall be a network of open surface drains of kacha drain and shall generally be designed to follow the natural flow of water and ground contours.

7.4 Suitable size plant peripheral drain of Brick masonry (CM 1:5) as per design and requirement shall be provided for smooth channelization of outside storm water and to avoid flooding in the plant. The size of all internal and road side drains shall not be less than 300mm (bottom width) x 300mm (depth).

7.5 The drain outfall shall be connected to the nearest existing natural drain(s)/ water

body outside plant premises and it shall be ensured that the drainage water shall not re-enter the plant nor encroach/ flood in the adjacent property/ plot. Also, necessary arrangement for disposing / lifting of accumulated surface water is to be made by providing pump and sump of required capacity shall be provided by bidder as per site requirement.

7.6 The proposed drainage scheme along with design calculations and drawings shall be submitted to the Engineer for review/ approval before start of construction.

8 PLANT LAYOUT

8.1 The contractor shall submit drawing showing proposed Project Plant and SPV module Layout.

8.2 The Plant and SPV module layout shall be a comprehensive drawing showing various requirements of the project like, Reference coordinate grid, Geographical and Plant North, Layout of existing boundary wall including coordinates of all corner points, Location of existing main entrance gate, Block wise FGL, Layout of main approach road to the plant, Internal roads, Temporary Storage yard/ facility to be used by the contractor during construction, Proposed Array layout, Lightening arrester, Storm water drains, Corridor for buried cables etc.

8.3 The cable corridor shall be laid through clear gap between arrays and shall not be laid below modules for easy maintenance.

8.4 All the facilities and buildings shall be presented with suitable Legend. The drawing shall be in suitable scale to have proper representation of the information. The Plant & SPV module layout drawing shall be submitted by the contractor for review/ approval by the Engineer.

9 DESIGN LOADS

9.1 Unless otherwise specified elsewhere, Dead load, Live load, Wind load and Seismic load for buildings and structures shall be considered as per provisions of relevant BIS standards.

9.2 Notes for MMS Design.

9.2.1 WL shall be considered as detailed below for estimation of WL under primary

loads:

i) WLx (downward), WLz (downward): Load due to positive pressure on design tilt angles of MMS members for wind acting in both (±X, ±Z) directions.

ii) WLx (upward), WLz (upward): Load due to negative pressure on design tilt angles of MMS members for wind acting in both (±X, ±Z) directions.

iii) WLx (member load), WLz (member load): Load due to wind action on side (exposed) face of respective MMS members (drag force) for wind acting in both (±X, ±Z) directions.

- ±WLx (member load, transverse to MMS table): Load due to wind action on column, front and back bracing, longitudinal bracing
- ±WLz (member load, along length of MMS table): Load due to wind action on column, rafter front and back bracing, longitudinal bracing

9.2.2 For estimation of design wind loads on purlins (Table 8 of IS 875- Part 3), WL (downward) and WL (upward) on modules (laid in the profile of mono slope canopy) shall be applied such that the center of pressure should be at (0.3 × length of canopy) from windward end (for simplicity, the wind load distribution may be taken as triangular with max. value at windward end).

9.2.3 In design of MMS (for height of structures less than 10 m from ground), 20% reduction in wind pressure as per Note under Cl. 6.3 of IS 875 – Part 3 is not permitted in case of purlins (members supporting modules), which shall be designed against action of WL corresponding to full wind pressure.

9.3 DESIGN LOAD COMBINATIONS

9.3.1 Appropriate Load factors in LSM design for concrete structures and appropriate Factor of safety in WSM design (ASD) for all steel structures including MMS shall be considered as per relevant BIS standard. No increase in permissible stress ispermitted in design of MMS.

9.3.2 Following load combinations shall be considered in design:

- For MMS Design:

(i) DL+LL

(ii) DL+LL + WLx (upward) ± WLx (member load)

(iii) DL+LL + WLx (downward) ± WLx (member load)

(iv) DL+LL + WLz (upward) ± WLz (member load)

(v) DL+LL + WLz (downward) ± WLz (member load)

(vi) DL+LL ± ELx

(vii) DL+LL ± ELz

- For RCC and Steel structures except MMS:

(i) DL+LL

(ii) DL ± WLx

(iii) DL ± WLz

(iv) DL+LL ± WLx

(v) DL+LL ± WLz

(vi) DL+LL ± ELx

(vii) DL+LL ± ELz

9.3.3 All buildings, structures and foundations shall be designed to withstand loads corresponding to worst design load combination.

10 FOUNDATIONS (GENERAL)

10.1 Contractor shall design all foundations for Canopy shed for placing control panels and other associated equipments, HT line Towers, Switch yard structures, Transformer, MMS & other structures as per relevant BIS standards and recommendations of Geotechnical investigation report.

10.2 No foundation for MMS, control panel sheds, switchyard equipment and structures, sub-stations, HT line towers, transformers, etc. shall rest on filled-up ground. However, minor structures like cable trench, cable rack, pipe pedestal, etc. may rest on filled-up soil with max. safe bearing capacity for design considerations not more than 3 T/Sqm.

10.3 Min. depth of foundation for plinth for open installations shall be 1.5 m below

NGL. For all other structures, min. depth of foundation shall be 1.0 m unless specified otherwise.

10.4 All design & drawings shall be submitted to the Engineer for approval before execution.

11 MMS FOUNDATION

11.1 Civil foundation design for Module Mounting Structures (MMS) as well as Canopy shed for placing control panels and other associated equipments, switch yard transformer / equipment shall be made in accordance with the Indian Standard Codes and soil conditions, with the help of Chartered Structural Designer having substantial experience in similar work. The Successful Bidder shall submit the detailed structural design analysis along with calculations and bases / standards. Module Mounting Structures Design is to be certified by Chartered Structure Engineer duly vetted by a reputed government institute and certificate to be produced along with the design details for approval by BBMB. The Contractor shall design, fabricate, supply and install module mounting structures with all required accessories like clamps, nuts, bolts, cable ties etc., The Module mounting structures shall be designed to adjust/tilt due to seasonal variation.

11.2 Pile integrity test of minimum 5% at random of total piles to be casted for MMS Structure or other relevant tests to be conducted on the foundation as per standard codes.

12 MODULE MOUNTING STRUCTURE (MMS)

12.1 Module Mounting Structure (MMS) shall comprise of rafter members directly fixed over foundation structure. The rafters shall support the purlin members, to which the modules shall be firmly secured either with clamps or appropriate number of bolts as per OEM specifications.

12.2 The module mounting structure design shall generally follow the existing land profile. The top of the table shall be in one plane.

12.3 In MMS analysis the column support shall be assumed at EGL/NGL.

12.4 In case of topographical variations more than 3o, the contractor shall carry out detailed study of its effect on array layout, shadow analysis and structural

stability of MMS.

12.5 The structure shall be designed to allow easy replacement of any module and shall be in line with site requirements.

12.6 The MMS stub/ column, rafter, purlin, ties and bracing members shall conform to following Indian standards.

- IS: 2062 – Hot rolled Medium and High tensile structural steel
- IS: 811 – Cold formed light gauge structural steel sections
- IS: 1161 – Steel tubes for structural purposes
- IS: 4923 – Hollow steel sections for structural use
- Minimum grade of steel for sections conforming to IS: 811 & IS: 4923 shall be E350 conforming to IS: 2062 and YSt 310 conforming to IS: 1608 respectively.
- Aluminum-Zinc Alloy metallic coated steel strip or sheet of grade YS350 and minimum coating class AZ200 conforming to IS 15961: 2012
- Anodized extruded aluminum sections of class designation 64430 and 65032 conforming to IS: 733 with minimum thickness of 4mm. The structural design shall conform to IS: 8147.

12.7 The contractor can also propose new light gauge structural steel other than specified in IS: 811 or structural aluminum sections subject to approval of the Engineer. In this case the contractor shall submit his proposal stating the technical advantages of the proposed sections for Engineer's review along with supporting literature and sample design calculations conforming to present specifications at the time of bidding.

12.8 Aluminum-Zinc Alloy metallic coated steel strip or sheet of grade YS350 and minimum coating class AZ200 conforming to IS 15961: 2012 may also be used for fabrication of purlin sections. In such a case, all the sections of the base metal exposed after cutting of members and punching of holes shall be provided with sprayed aluminium and zinc coating conforming to IS 5905.

12.9 If aluminum is used as the material for MMS, it shall employ anodized extruded aluminum sections of class designation 64430 and 65032 conforming to IS: 733 with minimum thickness of 4mm. The structural design shall conform to IS: 8147. No member shall be of length more than 4m.

12.10 If structural steel is used as the material for MMS, the minimum thickness excluding anti corrosive treatment (BMT) of various elements of MMS structure

shall be as following:

- Stub/ column – 3.15mm,
- Rafter – 2.5mm &
- Purlin – Minimum thickness of the purlin section excluding anti corrosive treatment (BMT) shall be 1.5 mm. Aluminum-zinc alloy metallic coated steel strip or sheet of grade YS350 and min. coating class AZ150 conforming to IS-15961:2012 may also be used for fabrication of purlin sections. In such a case, all the sections of the base metal exposed after cutting of members and punching of holes shall be provided with sprayed aluminum and zinc coating conforming to IS-5905.
- Other members – 2.0 mm

12.11 The design shall be done by Working stress method/Limit State Method and no increase in allowable stress shall be permitted.

12.12 The maximum permissible deflection/ side sway limits for various elements of MMS under serviceability conditions shall be as following:

- Lateral deflection/ side sway for Column – Span/ 240
- Vertical deflection for Rafter and Purlin – Span/ 180
- Lateral deflection for Purlin – Span/240

12.13 In case of natural frequency in first mode less than 5 Hz, the design of the MMS structure shall also be checked against dynamic effects of wind as per provisions of IS – 875 (Part-3) using gust factor method.

12.14 The purlins shall be provided with min. following tie/sag rods or angles or channels:

- 1 no., in the middle of each span and shall connect all the purlin members
- 1 no., diagonal, at each corner in end spans

12.15 Lateral restraint to compression flange if any due to PV panels is not permitted in purlindesign.

12.16 The vertical diagonal bracing shall be provided in end spans and every alternate spanof each unit (table) of MMS.

12.17 MMS shall support SPV modules at a given orientation & tilt and shall absorb and transfer the mechanical loads to the ground through foundation system.

12.18 Welding of structure at site shall not be allowed and only bolted connections shall be used.

12.19 The structure steel used in MMS shall be hot dip galvanized with minimum GSM 610 kg/ sqm and/or minimum coating thickness of 80 microns for protection against corrosion. Galvanization shall conform to IS-2629, 4759 & 4736 as applicable.

12.20 It is to be ensured that before application of this coating, the steel surface shall be thoroughly cleaned of any paint, grease, rust, scale, acid or alkali or any foreign material likely to interfere with the coating process.

12.21 The bidder shall ensure that inner side is also provided with galvanization coating.

12.22 The galvanization shall be done after fabrication of members and cutting of holes to ensure galvanization of all cut/ exposed edges.

12.23 In case the proposed section is made up of Aluminum, anodized coating shall be Gr. AC25 and shall conform to IS: 1868.

12.24 The array structure shall be so designed that it will occupy minimum space without sacrificing the output from SPV panels at the same time.

12.25 Two numbers of anti-theft fasteners of stainless steel on two diagonally opposite corners for each module shall be provided. All fasteners and washers (2 round + 1 spring) both for MMS connections and fixing of PV Module shall be adequately protected from atmosphere and weather prevailing in the area.

12.26 All fasteners for fixing the module over MMS shall be of SS 316 with property class A2-80 conforming to relevant ISO standard and must sustain the adverse climatic conditions to ensure the life of the structure for 25 years. Min. diameter of bolt for MMS connections shall be 10mm (12 mm in case of single bolt connection for seasonal tilt) except at column-rafter connection, where it shall not be less than 12mm (not less than 16mm in case of single bolt connection for seasonal tilt). In case of fixed tilt, min. two number of bolts shall be provided at each joint.

12.27 Modules shall be clamped or bolted with the structure properly. The material of clamps shall be Al / SS having weather resistant properties. Clamp/bolt shall have EPDM rubber washer and shall be designed in such a way so as not to cast any shadow on the active part of a module.

12.28 The array structure shall be grounded properly using maintenance free earthing kit.

12.29 The bidder/manufacturer shall specify installation details of the PV modules and the support structures with appropriate diagram and drawings.

12.30 The Bidder should design the structure height considering highest flood level at the site and the finished grade level. The minimum clearance between the lower edge of the module and the finished grade shall be the higher of (i) Highest flood level + 100mm

12.31 The length of one unit (Table) of MMS shall generally not be more than 20m.

12.32 The length of any cold formed section (CFS) shall not be more than 5.5 m.

12.33 The purlin splice shall be near the zone of contra-flexure, i.e., within a distance of 0.15L to 0.25L from the support, where L is the respective span within which splicing is located.

12.34 The purlin splice shall comprise of flange and web splice plates and splice design shall conform to Annexure-F of BIS: 800. For simplicity in fabrication, the splice member may be of CFS channel section without lips (CU).

12.35 For same member type, same section shall be used.

12.36 When any sag or tie member to the purlin (rod, angle or channel) is provided, it shall not be considered in modelling the structure for analysis except its effect as lateral support to the purlin members in strength design.

12.37 The contractor shall submit the detailed design calculations and drawings for MMS structure, bill of materials and their specifications/ standards to the Purchaser for approval before start of fabrication work as per the engineering work program (L2 schedule) as finalized during kick-off meeting.

13 CONCRETE WORKS

13.1 Construction of all RCC works shall be done with approved design mix and the materials used viz. Cement, coarse & fine aggregate, Reinforcement steel etc. shall conform to relevant BIS standards.

13.2 The minimum grade of concrete for all RCC works shall be M20 unless specified otherwise.

13.3 Unless otherwise specified elsewhere, PCC shall be of min. grade M10 (nominal mix 1:3:6) except for mud mat,

13.4 Reinforcement steel shall be of high strength TMT bars of grade Fe500 conforming to IS: 1786.

14 MISCELLANEOUS STEEL WORKS

14.1 Unless otherwise specified elsewhere, all structural steel work shall be designed as per provisions of IS: 800 with working stress method of design (WSD)/ /Limit State Method.

14.2 Structural steel hot rolled sections, flats and plates shall conform IS: 2062, structural Pipes shall be medium (M)/ high (H) grade conforming to IS: 1161, chequered plate shall conform to IS: 3502 and Hollow steel sections for structural purposes shall conform to IS: 4923.

15 BUILDINGS AND PLINTH FOR OPEN INSTALLATIONS

15.1 GENERAL REQUIREMENT

15.1.1 Canopy shed and plinth for open installations are required to be constructed for housing the electrical equipment/ panel for operation and maintenance of Photovoltaic Solar Power Plant. The existing control room building will be used for housing the control and relay and SCADA system. Any minor modification or renovation required for civil and electrical works in the existing 220 KV Control room building will be in the scope of contractor.

15.1.2 Inverter, Switchgear panel, Metering panel and associated equipment shall be installed on plinth as open installations. The plinth supporting the ICR/LCR equipment shall have RCC framed structure with foundations, columns and beams built up to the plinth level (FFL). There shall be suitable provision for easy passage of O&M personnel, cable trench, operating area, etc. as

required. Weather canopy shall be provided for all open installations. Canopy columns shall be supported on pedestals at plinth level.

15.1.3 The plinth for open installations and equipment area shall be designed with OEM requirements to ensure all satisfactory operations

15.1.4 The minimum plinth height (FFL) for all buildings and open installations shall be 1000 mm above FGL.

15.1.5 The contractor shall submit the proposed equipment layout drawings to the Engineer for approval before development of Architectural drawings.

16 FIRE EXTINGUISHERS

16.1 The required no. of fire extinguishers as per relevant BIS standard and NBC. Liquefied CO2/ foam/ ABC type fire extinguisher shall be upright type of capacity 10kg conforming to IS: 2171, IS: 10658.

16.2 The fire extinguisher shall be suitable for fighting fire of Oils, Solvents, Gases, Paints, Varnishes, Electrical Wiring, Live Machinery Fires, and all Flammable Liquid & Gas.

17 SAND BUCKETS

17.1 Sand buckets shall be wall mounted made from at least 24SWG sheet with bracket fixing on wall conforming to IS: 2546.

17.2 All buildings shall be provided with required no. of sand buckets as per relevant BIS standard and NBC. 4 No. of Bucket stands with four buckets on each stand shall be provided in the Transformer Yard.

18 SIGN BOARDS AND DANGER BOARDS

18.1 The sign board containing brief description of major components of the power plant as well as the complete power plant in general shall be installed at appropriate locations of the power plant as approved by Engineer

18.2 The Signboard shall be made of steel plate of not less than 3 mm. Letters on the board shall be with appropriate illumination arrangements.

18.3 Safety signs, building evacuation plan and direction signs, assembly points shall also be placed at strategic locations.

18.4 The Contractor shall provide to the Engineer, detailed specifications of the sign boards.

19 PIPE & CABLE TRENCHES

19.1 All trenches inside the building and transformer area shall be of RCC. The min. wall and base slab thickness shall be 100mm for depth ≤ 850mm and 150mm for depths > 850mm.

19.2 The trench shall be designed for loads as applicable. External trenches shall be kept min. 100mm above FGL to avoid entry of rain water. In case of straight length of the trench being more than 40m, suitable expansion joints with PVC water stop shall be provided.

19.3 Internal trenches (inside buildings) shall be provided with chequred plate (min. 8mm thick with stiffening angle ISA 50x50x6 @ 750 mm c/c for trench width greater than 800 mm) covers while external trench shall have precast concrete covers.

19.4 Min. thickness of precast cover shall be 50mm. Both bearing edges of the cable trench and all edges of pre-cast concrete covers shall be provided with min. 50x50x6 mm edge protection angle with lugs.

19.5 The trench cover (chequered or pre – cast both) shall be provided with suitable lifting hooks.

19.6 As required suitable MS insert plates shall be provided on trench wall to support the cable rack/ pipe.

19.7 The trench bed shall have a slope of approx. 1(V):250(H) along and 1(V):50(H) across the length of the trench. The cable trench shall have a dewatering sump (s) of size 450x450x450 mm depth at suitable location to facilitate collection & pumping out of rain water from the trench.

20 TRANSFORMER YARD CIVIL WORKS

20.1 Transformer and equipment foundations shall be founded on isolated spread footings or block foundation depending on the final geotechnical investigation report and functional requirements.

20.2 In case of transformer oil tank capacity ≥ 2000 litres, the transformer foundation

shall have its own soak pit which would cover the area of the transformer and cooler banks, so as to collect any spillage of oil in case of emergency. The retention capacity of the soak pit shall be equal to volume of the transformer oil (excluding free space above gravel) and it shall be filled with granite stone gravel of size 40mm, uniformly graded, with 200 mm free space above gravel fill.

20.3 In case of transformer oil tank capacity more ≥ 20000 litres, the soak pit shall be connected to a separate burnt oil pit through discharge pipe (300 mm dia) and shall be suitably sized to accommodate full oil volume (excluding free board above inlet pipe) of the transformer connected to it, without backflow. In this case the capacity of the soak pit may be reduced to min. 1/3rd of the total transformer oil volume. The burnt oil pit shall be further connected to oily water drainage system. The water shall be discharged into the nearest drain by gravity flow or pumping after suitable treatment as per statutory and code provisions.

20.4 Both, the transformer soak including side walls and the burnt oil pit shall be of RCC and shall be provided with sump (min. 500 mm x 500 mm x 400mm deep) and slope of 1:50 in concrete screed of 1:1.5:3 to the floor slab towards the sump pit. The oil collection pit shall be provided with 20mm dia. MS rung ladder with 2 coats of epoxy paint over 2 coats of primer, a manhole & removable RCC cover. The inside of oil collection pit shall be plastered with 6 mm thick CM 1:6 and painted with 2 coats of epoxy paint over 2 coats of primer.

20.5 The area around the transformer and equipment shall be covered with uniformly graded granite stone gravel of size 40mm.

20.6 The area shall be provided with galvanized chain link fence of height min 1.8m with 3.5m wide gate. The specifications fence post which shall be of MS angle (ISA 65x65x6) spaced at 2.5 m c/c.

20.7 The Gate of size 3.5m shall be of MS pipe (medium class conforming to IS: 1161) frame with hard drawn steel wire fabric mesh (50x50mmx3mm thick conforming to IS: 1566) including all accessories and fittings. MS angle posts shall conform to IS 2062.

20.8 In addition to main gate a wicket gate of MS pipe (medium class conforming to IS: 1161) frame with 1.0 m width with hard drawn steel wire fabric (50x50x3mm thick conforming to IS: 1566) shall be provided for man entry for maintenance purpose.

20.9 The transformer yard fencing work shall conform to CEIG requirements.

20.10 The requirement of fire barrier wall between transformers shall be as per Electricity Rules and IS: 1646 recommendations. Minimum wall thickness shall be 230mm for RCC wall and 300mm for masonry wall.

21 PV MODULE CLEANING SYSTEM – WET

WET TYPE CLEANING SYSTEM

21.1 The contractor shall design and install the effective module cleaning system. The laying, providing and jointing water supply line from the pump house/UGR in residential colony to solar site will be in the scope of contractor However, the water for drinking, cleaning of PV modules and construction purpose during construction and O&M period will be made available free of cost at tapping point.

21.2 A regular supply of suitable quantity of water shall be ensured by the contractor to cater day-to-day requirement of drinking water and for cleaning of PV modules during entire O&M period.

21.3 The Contractor shall estimate the water requirements for cleaning the photovoltaic modules at least once in two week or at closer frequency as per the soiling conditions prevailing at site, in order to operate the plant at its guaranteed plant performance. Also, the contractor is required to plan the water storage accordingly with provision of a tank of suitable capacity for this purpose (1,00,000 liters at Bhiwani and 25,000 liters at Hisar). However, min. consumption of 2 Ltr / Sqm of surface area of SPV module shall be considered in estimation of required quantity of water storage.

21.4 Water used for drinking & PV module cleaning purpose shall generally be of potable quality and fit for cleaning the modules with TDS generally not more than 75 PPM. In case of higher salt contents, the water shall be thoroughly squeezed off to prevent salt deposition over module surface. However, water with TDS more than 200 PPM shall not be used directly for module cleaning without suitable treatment to control the TDS within acceptable limits. The water must be free from any grit and any physical contaminants that could damage the panel surface. Necessary measures be taken to ensure no grit or physical

contaminants pass through.

21.5 If required, for settlement of any grit/ unacceptable suspended particles in the water a settling tank shall be installed before the inlet of the storage tank. Suitable arrangement for discharge/ disposal of sediment/ slush shall be provided in silting chamber by gravity disposal in surface drain or with provision of sludge sump and pump of adequate capacity.

21.6 The module cleaning system shall include construction of RCC tank, pumps (including 1 No. standby pump), water supply mains and flexible hose pipes, taps, valves (NRV, Butterfly valve, Ball valve, Gate valve, PRV, scour valve etc.), Water hammer arrester(s), pressure gauge, flow meter etc. as per the planning & design.

21.7 The water supply mains could be either of GI, uPVC or HDPE, however, the vertical pipe connecting supply main to the discharge point shall be of GI.

21.8 Masonry chamber shall be provided for Main gate valve at pump end. Whereas, as per requirements, at other locations either a masonry or GI/ HDPE pipe chamber may be provided.

21.9 Module cleaning procedure and pressure requirement at discharge point shall be as per the recommendation of PV module manufacturer. However, discharge pressure at outlet shall not be less than 5 kgf/cm2 (0.5 MPa).

21.10 All the pipes thus laid shall be buried in ground at least 150mm below FGL or laid above ground clamping on suitable concrete support blocks. In case of above ground piping only GI pipes shall be used.

22 TRANSMISSION LINE STRUCTURES

22.1 Galvanized 220 kV and 132 kV Transmission Line towers, Tower extensions & accessories and 11 kV, 22kV, 22kV & 33 kV transmission poles, towers & accessories shall be designed following latest guidelines of respective SEB (State electricity board)/ STU (State transmission utility)/CTU/BBMB and get approved from them before execution. In absence of SEB/ STU/BBMB/CTU guidelines REC (Rural Electrification Corporation) standards may be followed. Support at corner with angle > 100 shall be provided with a 4-pole structure or a lattice tower structure. Use of PCC spun pole and RCC pole is not acceptable.

22.2 Approved copies of these designs & drawings shall be submitted to the Purchaser for reference and record.

23 MISCELLANEOUS STRUCTURES

23.1 SUPPORT STRUCTURE FOR WEATHER MONITORING DEVICE

23.1.1 Weather monitoring device shall be mounted on tubular steel pole of required height.The pole shall conform to IS: 2713.

23.1.2 The pole shall be secured to an independent RCC foundation structure through Base plate and Anchor bolt assembly.

23.1.3 200 long 20 dia. rods shall be welded to the pole at 300 mm C/c for access to the device for maintenance purpose.

23.1.4 The support structure shall be hot dip galvanized.

23.2 SUPPORT STRUCTURES FOR SCB

23.3 When supported independently, the SCB shall be mounted on a structural steel supporting frame of galvanized ISMC 75.

23.4 Column post and bracings shall be supported with 300 mm (min.) diameter and 850 mm (min.) deep below GL piles in cement concrete (M25 Grade Concrete). The column post and bracings shall be extended into the piles upto 800 mm with 50mm cover at the bottom.

23.5 The pile shall project 200 mm above GL.

23.6 The support structure shall hot-dip galvanized and of adequate height to ensure min. ground clearance of .8 m to SCB unit.

D QUALITY ASSURANCE AND INSPECTION OF CIVIL WORKS

1 INTRODUCTION

1.1 This part of the specification covers the sampling, testing and quality assurance requirement (including construction tolerances and acceptance criteria) for all civil andstructural works covered in this specification.

1.2 This part of the technical specification shall be read in conjunction with other parts of the technical specifications, general technical requirements & erection

conditions of the contract which covers common QA requirements. Wherever IS code or standards have been referred they shall be the latest revisions.

1.3 The rate for respective items of work or price shall include the cost for all works, activities, equipment, instrument, personnel, material etc. whatsoever associated to comply with sampling, testing and quality assurance requirement including construction tolerances and acceptance criteria and as specified in subsequent clauses of this part of the technical specifications.

1.4 The QA and QC activities in all respects as specified in the technical specifications/ drawings / data sheets / quality plans / contract documents shall be carried out at no extra cost.

1.5 The contractor shall prepare detailed construction and erection methodology scheme which shall be compatible to the requirements of the desired progress of work execution, quality measures, prior approvals from statutory authorities etc. if any and the same shall be got approved from the Engineer.

1.6 If required, work methodology may be revised/ reviewed at every stage of execution ofwork at site, to suit the site conditions, work progress commensurate with project schedule by the contractor at no extra cost to the Engineer

2 QA AND QC MANPOWER

2.1 The contractor shall nominate one overall QA coordinator for the contract detailing thename, designation, contact details and address at the time of post bid discussions.

2.2 All correspondence related to Quality Assurance shall be addressed by the contractor's QA coordinator to the Purchaser.

2.3 Purchaser shall address all correspondence related to Quality issues to the contractor's QA coordinator. The contractor's QA coordinator shall be responsible for co-ordination of Quality activities between various divisions of the contractor and theirsub-vendors on one hand & with Purchaser on the other hand.

2.4 The contractor shall appoint a dedicated, experienced and competent QA & QC in- charge at site, preferably directly reporting to the Site-in-charge, supported as necessary by experienced personnel, to ensure the effective implementation of

the approved QAP.

2.5 The contractor shall finalize and submit a deployment schedule of QA & QC personnel along with their details to Purchaser for approval/ acceptance and further shall ensure their availability well before the start of the concern activity.

3 SAMPLING AND TESTING OF CONSTRUCTION MATERIALS

3.1 The method of sampling for testing of construction materials and work / job samples shall be as per the relevant BIS / standards / codes and in line with the requirements of the technical specifications / quality plans.

3.2 All samples shall be jointly drawn, signed and sealed wherever required, by the contractor and the Purchaser or his authorized representative.

3.3 The contractor shall carry out testing in accordance with the relevant IS standards/ codes and in line with the requirements of the technical specifications / quality plans. Where no specific testing procedure is mentioned, the tests shall be carried out as per the best prevalent engineering practices and to the directions of the Purchaser.

3.4 All testing shall be done in the presence of Purchaser or his authorized representative in a NABL accredited / Govt. Laboratory acceptable to Purchaser.

3.5 The test samples shall be jointly selected and sealed and signed by the Site-in-charge and thereafter these shall be sent to the concerned laboratory.

3.6 The test report along with the recommendations shall be obtained from the laboratory without delay and submitted to Purchaser.

4 PURCHASE AND SERVICE

4.1 All structural steel shall be procured only from main steel producers In case of non- availability of some of the sections with main steel producers, the contractor may propose to procure the sections from the re-rollers of the main steel producers, the name of such re-rollers will have to be cleared by the Purchaser for which details such as BIS approval, main steel producer's approval, past experience for production of sections of specified material, details of machines, plant, testing facilities etc.

4.2 Confirmation that the process control and manufacturing of steel sections by re-rollers shall be same as that of main steel producers, that billets for re-rolling will

only be sourced from main steel producers shall be furnished with regard to re-roller.

4.3 For Module Mounting Structures (MMS), sources of steel other than those specified under this clause may also be used subject to the condition that they otherwise meet the requirements of the Technical Specifications / Bid documents. Even after clearance of re-rollers, induction of billets with identified and correlated test certificates–in the process of re-rolling, sampling of steel, quality checks thereof and stamping of final product for further identification and correlation with prior to dispatch shall be the responsibility of the contractor and these shall be performed in presence of the authorized representative of the main Contractor.

4.4 Reinforcement steel shall be procured only from main steel producers and test certificates shall be obtained and submitted to the Purchaser for correlation.

Annexure – A

Pre-dispatch Inspection Protocol

for

Crystalline PV Modules by Purchaser

CONTENTS

PRE-DISPATCH INSPECTION PROCEDURE

1. OBJECTIVE:

The objective of this document is to establish General inspection protocol with objectivity for verification of Quality Parameters of Solar Modules by the Purchaser prior to dispatch. The decision rules and procedure specified herein seek to uphold quality standards based on industry best practices and technical specifications laid out in tender documents as well as to control risks associated with item procurement.

2. STANDARDS AND CODES (AS APPLICABLE):

1. Sampling for determining Acceptance Quality Level (AQL) shall follow ISO 2859-1:1999.
2. IEC TS 60904-1-2:2019 - Photovoltaic devices - Part 1-2: Measurement of current-voltage characteristics of bifacial photovoltaic (PV) devices.

3. DEFINITIONS:

1. Lot: All products/items manufactured in one batch.

   Notwithstanding the aforementioned definition, the purchaser can lay down alternate/additional criteria for determining a lot.

2. Major Defect: A defect that reduces the usability or causes the product to fail to fulfil its nominal characteristic function.
3. Minor Defect: A defect that does not reduce the usability of the product, but does not meet the quality standard.

4. INSPECTION SCHEDULE:

Bidder shall propose the schedule for Pre-despatch Inspection of Finished Goods to the Purchaser well in advance, and in no case less than 15 days prior to commencement of Inspection.

5. SCOPE OF INSPECTION:

Supplier representative will accompany the Inspector while doing the inspection which shall typically consist of 2 steps for clearance of each Lot:

BOM verification: To be conducted prior to the commencement of production.

The details of materials used will be verified from the ERP/Manufacturing data and corroborated with the Construction Data Form (CDF). This shall include verification of following:

Item	**Method of Verification**
Shelf life of the following BOMitems: • EVA • PV Module Back sheet • Sealant and potting material (Silicone)	Verify the expiry date/shelf life and storageconditions *The PV Module manufacturer shall submit allrequired information to prove that materials being used are within their shelf life.*

Note: Supplier shall provide the necessary documents for approval of BOM as per IEC standards and tender Technical Specifications.

Witness Tests:

Manufacturer shall assist the Inspecting agency to witness following checks, the details of which are provided elsewhere in this document:

I. Flash test- As per sampling Plan
   For Bifacial Modules, Measurement of current-voltage characteristics shall be done as per IEC TS 60904-1-2:2019 - Photovoltaic devices - Part 1-2
II. Visual Inspection- As per sampling Plan
III. EL Inspection-As per Sampling Plan
IV. Electrical Characteristics (Other than Flash Test)- As per Sampling Plan

Note: The Supplier shall furnish soft and hard copy of the Production Quality Plan prior to commencement of the Inspection.

6. SAMPLING PROCESS:

a. Supplier shall provide the list of modules in a lot ready for despatch, along with flash test data (Measured Electrical Data, P_{max}) prior to commencement of Inspection tests.

Note: Smallest lot size for Inspection: 20% of the capacity as per the PO.

b. Supplier will arrange to move the PV Modules from FG to Inspection area.

c. Same samples shall be used for all Witness Tests stated at 5.2 above.

d. Inspector shall commence Inspection process by randomly selecting samples from the list of serial nos. (pallet-wise) provided by Supplier as per ISO 2859: Single Sampling Plan for Normal Inspection, General Inspection plan level-I. However, the Inspector shall reserve the right to switch to tightened or reduced level of Inspectionas per the lot quality.

7. DECISION RULES FOR ACCEPTANCE/REJECTION

Following is a summary of Decision Rules for Acceptance/Rejection of a given Sample in a lot offered for Inspection:

Table 1: AQL Levels

Defect Type	Acceptable Quality Limit (AQL) (%)
Major (Ma)	2.5
Minor (Mi)	4

Table 2: Inspection Levels

Inspection steps	Inspection item	Inspection level
1	Flash Test	General inspection level I
2	Visual	General inspection level I
3	EL	General inspection level I
4	EC (Other than Flash Test)	10 Nos. per lot

8. INSPECTION PROCESS

A. ELECTRICAL INSPECTION – FLASH TESTS

For Electrical inspection following preparation will be done:

- Module Temp Stabilisation: Modules will be kept in controlled environmental condition till it reaches 25 ±2°C
- Calibration of Sun-simulator: Sun-simulator will be calibrated as per Calibration Reference. Reference should be calibrated against Calibration Reference tested from reputed testing lab TUV / Fraunhofer etc. Testing of modules will be done atSTC condition, AM=1.5

Note:

(i) All modules selected for sampling inspection will be re-tested in the sun-simulator. A P_{max} retest (repeatability test) variation of ± 2 % on actual flash P_{max} value will be acceptable.

(ii) The Supplier shall provide a valid calibration certificate of the apparat us used.

B. VISUAL INSPECTION:

- Customer representative will verify the module visual characteristics as per the Visual Acceptance norms.
- The Visual Inspection shall be carried out in a well-lit room. It shall be theresponsibility of the Supplier to ensure adequate brightness in the room.

C. ELECTROLUMINESCENCE (EL) INSPECTION:

- The EL image shall have sufficient resolution for analysis of defects.
- Hi-pot test shall be done as per IEC procedure. The Supplier shall provide a valid calibration certificate of the apparatus used.

9. RE-INSPECTION AND REVIEW

In case of minor non-conformities like cleaning issues, label mismatch, etc. which

can be easily reworked, Supplier shall rework/replace the modules and offer them for re-inspection to Inspector.

10. INSPECTION SUMMARY:

Once the inspection is completed Customer Representative will compile his Inspection Summary Report and share with Supplier and give necessary recommendation on despatch depending upon the audit findings based on the observations made. This report shall be provided within same day of inspection (Format Attached).

11. DISCLAIMER:

Inspection by Purchaser does not absolve the responsibility of the Supplier/vendor to ensure quality during production of the material and its transport to site. Any damages during transport/ handling shall be replaced before erection at site as directed by Site-in-charge without any extra cost to the purchaser.

SAMPLING PLAN

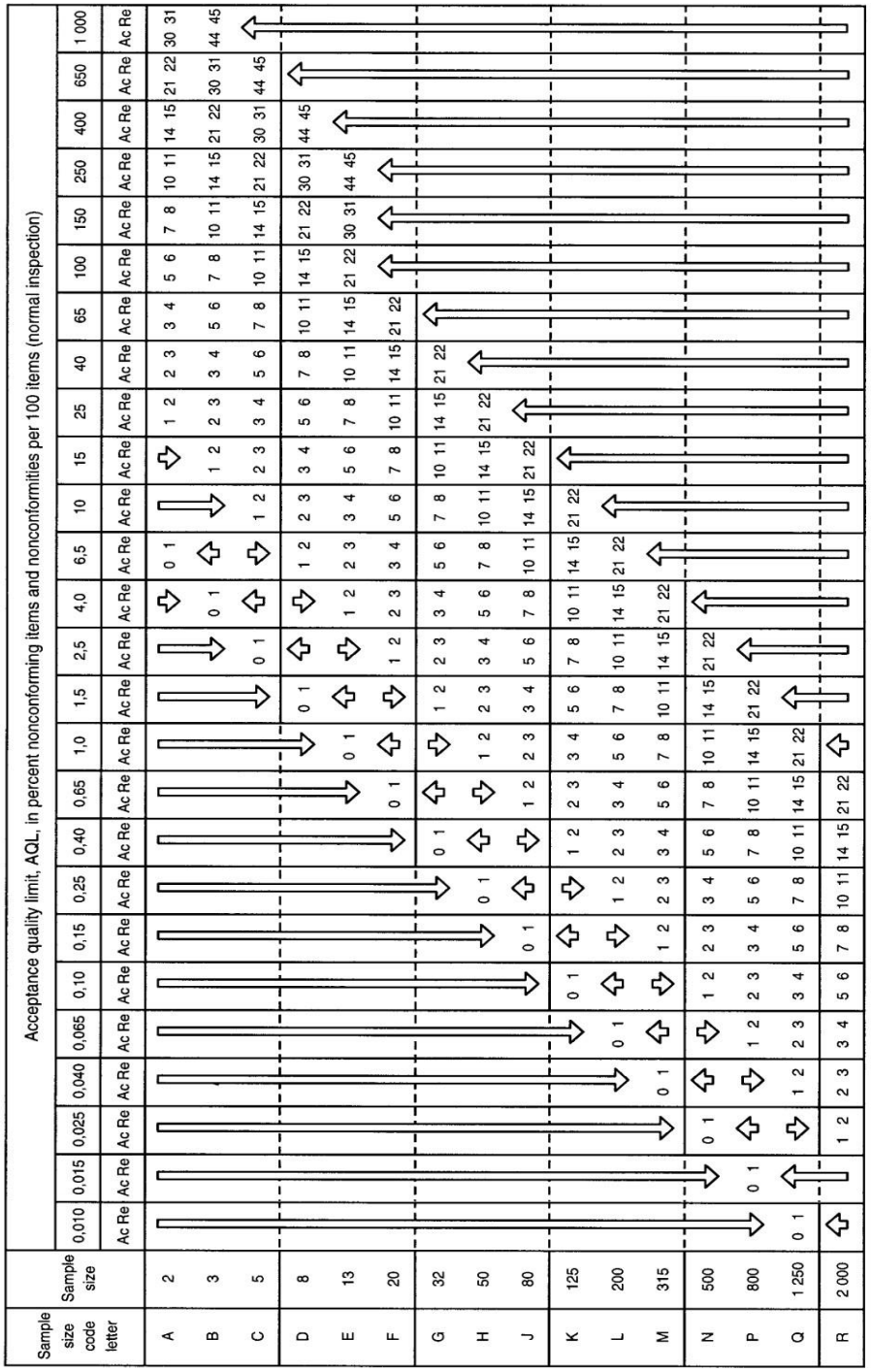
(Sampling Plan as Per ISO 2859) -1

Table 1 - Sample size code letters (see 10.1 and 10.2)

Lot size		Special inspection levels				General inspection levels		
		S-1	S-2	S-3	S-4	I	II	III
2 to	8	A	A	A	A	A	A	B
9 to	15	A	A	A	A	A	B	C
16 to	25	A	A	B	B	B	C	D
26 to	50	A	B	B	C	C	D	E
51 to	90	B	B	C	C	C	E	F
91 to	150	B	B	C	D	D	F	G
151 to	280	B	C	D	E	E	G	H
281 to	500	B	C	D	E	F	H	J
501 to	1 200	C	C	E	F	G	J	K
1 201 to	3 200	C	D	E	G	H	K	L
3 201 to	10 000	C	D	F	G	J	L	M
10 001 to	35 000	C	D	F	H	K	M	N
35 001 to	150 000	D	E	G	J	L	N	P
150 001 to	500 000	D	E	G	J	M	P	Q
500 001 and over		D	E	H	K	N	Q	R

(Sampling Plan as Per ISO 2859) – 2 – Normal, Tightened and Reduced)

Table 2-A — Single sampling plans for normal inspection (Master table)



⇩ = Use the first sampling plan below the arrow. If sample size equals, or exceeds, lot size, carry out 100 % inspection.

⇧ = Use the first sampling plan above the arrow.

Ac = Acceptance number

Re = Rejection number

Table 2-B — Single sampling plans for tightened inspection (Master table)

Sample size code letter	Sample size	Acceptance quality limit, AQL, in percent nonconforming items and nonconformities per 100 items (tightened inspection)																										
		0,010	0,015	0,025	0,040	0,065	0,10	0,15	0,25	0,40	0,65	1,0	1,5	2,5	4,0	6,5	10	15	25	40	65	100	150	250	400	650	1 000
		Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re
A	2	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	⇧
B	3	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇧
C	5	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇧	⇧
D	8	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇧	⇧	⇧
E	13	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇧	⇧	⇧	⇧
F	20	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	⇧	⇧	⇧	⇧	⇧	⇧	⇧
G	32	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧
H	50	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧
J	80	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧
K	125	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧
L	200	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧
M	315	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧
N	500	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧
P	800	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧
Q	1 250	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧
R	2 000	0 1	⇧	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧
S	3 150			1 2																								

⇩ = Use the first sampling plan below the arrow. If sample size equals, or exceeds, lot size, carry out 100 % inspection.

⇧ = Use the first sampling plan above the arrow.

Ac = Acceptance number

Re = Rejection number

Table 2-C — Single sampling plans for reduced inspection (Master table)

Sample size code letter	Sample size	Acceptance quality limit, AQL, in percent nonconforming items and nonconformities per 100 items (reduced inspection)																										
		0,010	0,015	0,025	0,040	0,065	0,10	0,15	0,25	0,40	0,65	1,0	1,5	2,5	4,0	6,5	10	15	25	40	65	100	150	250	400	650	1 000
		Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re
A	2	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇩	⇩	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31	⇩
B	2	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31	⇩
C	2	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	14 15	21 22	⇩	⇩
D	3	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	14 15	21 22	⇩	⇩	⇩
E	5	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	14 15	21 22	⇩	⇩	⇩	⇩
F	8	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	⇧	⇧	⇧	⇩	⇩	⇩	⇩
G	13	⇩	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	⇧	⇧	⇧	⇧	⇩	⇩	⇩	⇩
H	20	⇩	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	⇧	⇧	⇧	⇧	⇧	⇩	⇩	⇩	⇩
J	32	⇩	⇩	⇩	⇩	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	⇧	⇧	⇧	⇧	⇧	⇧	⇩	⇩	⇩	⇩
K	50	⇩	⇩	⇩	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇩	⇩	⇩	⇩
L	80	⇩	⇩	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇩	⇩	⇩	⇩
M	125	⇩	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇩	⇩	⇩	⇩
N	200	⇩	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇩	⇩	⇩	⇩
P	315	⇩	0 1	⇧	⇩	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇩	⇩	⇩	⇩
Q	500	0 1	⇧	⇧	⇩	1 2	2 3	3 4	5 6	6 7	8 9	10 11	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇩	⇩	⇩	⇩
R	800	⇧	⇧	⇧	1 2	2 3	3 4	5 6	6 7	8 9	10 11	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧	⇧

⇩ = Use the first sampling plan below the arrow. If sample size equals, or exceeds, lot size, carry out 100 % inspection.

⇧ = Use the first sampling plan above the arrow.

Ac = Acceptance number

Re = Rejection number

CUSTOMER INSPECTION REPORT

CUSTOMER INSPECTION REPORT			
Ref. No. & Date:			
Client:		**EPC Contractor**: PO Ref. No.:	
Place of Inspection:	**Date of inspection:**	**Lot Size**	**Sample Quantity**
Problem Quantity: **Detail:** **Inspection Result (OK/Not OK):**			
Visual Inspection **Problem Quantity:** **Detail:**			
Flash Test Problem Quantity: Detail:			
EL Inspection: **Problem Quantity:** **Detail:**			
EC Inspection (Hipot,DC Continuity,IR): **Problem Quantity:** **Detail:**			
Any Other Criteria/Remarks:			
Is the shipment qualified to be released? **Yes** **No**			
From Client	☐ ☐ From EPC Contractor		

Enclosed: Test Details, Flash Test Report, EL test (images- soft copy), EC Test Report

Disclaimer: *This Inspection by Purchaser does not absolve the responsibility of the vendor to ensure quality during production of the material and its transport to site. Any damages during transport/ handling shall be replaced before erection at site as directed by Engineer-in-charge without any extra cost to the purchaser.*

Details:

Lot :				**Date**
S.No.	**Defect**	**Module Id**	**Type (Ma/Mi)**	**Details**
1				
2				
….				

Annexure – C

PG Test

Procedure

TABLE OF CONTENTS

1 INTRODUCTION

This document lays down the procedures and requirements for conducting Functional Guarantee tests including scope of the tests, procedures for the tests, reporting formats and process for determining test results in accordance with the Tender Specifications, applicable standards and industry best practices.

2 FUNCTIONAL GUARANTEE TESTS FOR SOLAR PV PLANT

Functional Guarantee for Solar PV Plant shall comprise of following Guarantees:

(1) Performance Ratio Guarantee test for operational acceptance.

2.1 PERFORMANCE RATIO GUARANTEE TEST

A Performance Ratio Guarantee test shall be commenced after the commissioning of Plant Facilities to demonstrate that the plant has achieved the Guaranteed Performance Ratio in line with requirements under section VII of the bidding document. This will be one of the pre-conditions for the Plant Operational Acceptance. Performance Ratio (PR) test period would be continuous measurement of 30 consecutive days. The test shall be conducted in accordance with the IEC-61724 as per the methodology described in Technical Specifications under section VII of the bidding document. The procedure of PR test is described further in Section 2.1.4. The report shall contain all the measured energy and Met data values, calculations, results and conclusions.

2.1.1 PERFORMANCE RATIO

The Performance Ratio (PR) of the PV Plant is calculated as follows (according to IEC 61724).

$$PR = \frac{E_{out}}{\sum_k \left(\frac{(C_k \, X \, P_o) \, X \, (G_{i,k} \, X \, \tau_k)}{G_{i,ref}} \right)}$$

Where,

PR Temperature Corrected Performance Ratio

Eout	Cumulative AC energy measured at the Plant End (ABT meter) over the duration of reporting period (kWh)
τ_k	Duration of the kth recording interval, i.e. (1/60) hour
$\sum k$	Summation over all recording intervals in the reporting period, (1/4) hour
Ck	Power rating temperature adjustment factor and can be calculated as below Ck = 1 + γ x (Tavg_mod,k – Tref)
γ	Temperature coefficient of power with negative sign (°C^{-1})
Tavg_mod,k	Average PV Module temperature measured at the commencement of time interval 'r_k'(°C)
Tref	PV Module temperature at which Po is determined, i.e. 25°C
Po	Installed nominal peak power of PV modules, i.e. Name plate rating at STC (kWp)
G_i,	Average irradiance measured at the Plane of Array (POA) at the commencement of time interval r_k (kW/m^2) (average of all Pyranometres in various sites)
Gi,ref	Irradiance value at which Po is determined, i.e. 1 kW/m^2

2.1.2 GENERAL REQUIREMENT

- The Functional Guarantee shall comprise of a set of visual/mechanical/Electrical checks followed by a Performance Ratio (PR) test of the Plant Facilities.
- The PR test shall be carried out for a period of 30 days at site by the Contractor in presence of the Purchaser/ Purchaser's Representative/ Site-in-Charge.
- These tests shall be binding on both the parties to the contract to determine compliance of the equipment with the guaranteed performance parameters.
- The test will consist of guaranteeing the correct operation of the Plant Facilities, by way of the performance ratio based on the reading of the energy

produced and delivered to the grid (ABTmeter) and the Plane of Array incident solar radiation.

- PR is calculated as per the formula given in Clause no. 2.1 and recorded as per the format provided at Annexure 1.
- The filled-in format shall be signed by both the parties (EPC Contractor and Sie-in-charge) and each party will keep one copy for record. The same will be recorded for 30 days.
- The Functional Guarantee condition for the purpose of Provisional Acceptance of the Plant Facilities shall be considered to have been met if the average of daily PRs (for 30 days*) is greater than or equal to the guaranteed Performance Ratio (PR).
- During this PR test, equipment failure/interruption of any kind, except for SCADA communication failures, will not be accountable. In case of a breakdown, the test may be resumed once the complete system is rectified and working properly.
- * 30 days excluding any interruption due to rainy/cloudy day or allowable Interruptions as per this document. Interruptions due to communication breakdown only may be exempted based on specific approval to the effect that generation is not affected and equipment failure (Refer Clause 2.1.5) is not attributable. In such case, the test shall be extended for affected no. of days (up to 5 days).

2.1.3 PRE-PR TEST

2.1.3.1 The EPC Contractor shall perform start-up tests after completion of Commissioning and Test Procedure as per Annexure – D: Plant Documentation, Commissioning and Test Procedure and recording of punch points.

2.1.3.2 Functional Guarantee Test shall commence immediately after all issues arising from the functional/ start-up test have been rectified.

Note:

(a) All measurement(s) procedure should be carried out taking proper safety

precaution.

(b) Also it should be ensured that to avoid any loose connection at the terminal points for which measurement procedure is conducted.

(c) Ensure proper functioning (e.g. Multimeters shall be calibrated) of all measuring instruments before conducting above measurement procedure.

(d) The above test procedure shall be conducted in presence of site in-charge.

2.1.4 PR TEST PROCEDURE

The date of commencement of the PR Test shall be communicated in advance and agreed upon by both parties i.e. Purchaser and EPC Contractor. Any consecutive 30 days period (excluding interruptions that last entire day on account of grid outage or as per hindrance record maintained at site or weather conditions) for the purpose of conducting PR test shall be mutually discussed and agreed between site-in-charge and EPC Contractor. It shall comprise of the following procedures.

2.1.4.1 PRE-TEST PROCEDURE

(1) Before the commencement of Performance Ratio (PR) test, the plant shall have completed Pre-PR tests as per Clause 2.1.3 above and SCADA system and WMS shall be fully commissioned and functional.

(2) Trial Run: The PG Test for Plant Facilities shall commence with a trial run for 7 consecutive days. The EPC Contractor shall provide the data in requisite formats (specified elsewhere in the document) to Purchaser. Purchaser shall vet the data for any discrepancies and systemic errors and revert within 3 working days. Post the trial run period, the 30 days PR test will commence after communication from Purchaser in this regard.

(3) Pyranometer Tilt Angle & Cleanness: The pyranometers & Tilt Angle shall be verified before the test commences and then visually inspected at regular intervals for cleanliness during the tests.

(4) The average POA radiation of all the Pyranometers shall be considered for the calculation of PR. The average of module temperatures recorded by all

the temperature sensors shall be used for calculation of PR. The Pyranometers and Temperature sensors used for the purpose of the PR Test shall have valid calibration certificates.

2.1.4.2 Following the completion of the pre-test procedures, Performance Ratio Test of plant shall commence in accordance with the procedures, conditions and requirements provided in the next section.

2.1.4.3 GENERAL PROCEDURE FOR THE PR TEST

The PR Test Procedure shall include the following components:

(1) Data Collection: PV Power Plant test related parameters are collected in one-minute and 15 intervals for the 30 (Thirty) days reference period. The data shall consist of the following at a minimum:

- Irradiance at Collector's (i.e. PV Module) POA; (Source: SCADA, Temporal Resolution: 1 minute) Average values form all the sites will be considered
- Other Met Data received from installed WMS; (Source: SCADA, Temporal Resolution: 1 minute)
- Energy generated at Plant (kWh) (Source: Plant TVM Meter from SCADA, Temporal Resolution: 1 minute)
- Energy injected into grid (kWh) (Source: Plant End ABT Meter, Temporal Resolution: 15 minute)
- PV Module Temperature recorded from the temperature Sensors (oC) (Source: SCADA, Temporal Resolution: 1 minute)

(2) **Data Filtering:** The data shall be filtered so that the data set is free of nuisance data points and bad data that exhibit a high degree of error (such as errors caused by faulty instrumentation). The EPC Contractor shall document data which is to be eliminated along with reasons. The following criteria shall be excluded from the dataset used for this test:

- **Nuisance or bad data** – Nuisance data points or bad data that clearly exhibit a high degree of error (eg. due to rainy/cloudy weather or meteorological measurement equipment that is identified as being out of

calibration or requiring adjustment). A 15- minute time-block shall be *explicitly* flagged through a flag parameter on account of this factor after recording reasons thereof (**Note**: no filtration shall be done at site level). The same shall be corroborated/verified by Purchaser. Suitable statistical methods may be applied to identify such erroneous data.

- Time blocks with insufficient (less than equal to 10) 1-minute records.
- Grid Interruptions – Time periods (in 15-minute time blocks) of the grid interruptions at the utility substation, recorded manually jointly by EPC Contractor and site-in-charge representatives shall be eliminated. Grid outage period, if any, shall be verified from SCADA.
- Any Force majeure conditions
- **Radiation Criteria** – Radiation on Plane of Array (POA) less than 200 W/m2
- Shutdown explicitly demanded by the BBMB/CTU/DISCOM/STU.
- As per the hindrance record maintained at site.

Note: Minimum 24 Nos of 15-minute time blocks shall be considered to account the day for PR measurement. Otherwise the PR test shall be extended to another day.

2.1.5 DETERMINATION OF PR TEST

Daily PR shall be calculated as the average of the PR calculated for valid 15-minute time blocks (Refer Clause 2.1.4.3) for the 30-day duration. If the ABT Meter data is not available on daily basis, PR shall be calculated based on the MFM data and shared for record. However, at the end of the PR test period, the daily PR shall be re-calculated with the ABT Meter data for sign-off.

If the If the EPC Contractor is not able to demonstrate guaranteed PR during this period, two more chances shall be given to demonstrate the same after incorporation of suitable corrective measures. In case the contractor fails to achieve guaranteed PR even after the two more chances, further action shall be taken as per the provisions of contract.

The test shall be repeated for 30 days in case of any outage of following equipment (as applicable)for more than 7 days.

- Power Transformer/Inverter Duty Transformer
- Power Conditioning Unit
- HT Switchgear Panel
- SCADA and data logger combined
- Tilted pyranometer
- Other WMS sensors.

2.1.6 RAW DATA FORMATS AND REPORTS

The EPC Contractor shall submit to Purchaser the raw data from the Plant SCADA on daily basis in thefollowing format.

Temporal Resolution: 1 Minute

Date & Time dd/mm/yyyy hh:mm:ss format	Wind Speed (m/s)	Module Temp. (°C)	Ambient Temp. (°C)	Horizontal Irradiance (W/m²)	POA Irradiance (W/m²)	POA Radiation (kWh/m²)	Humidity (%)	Wind Direction (°)	Generation (kWh) (Source: TVM)

Temporal Resolution: 15 Minute (Every 15th Min record from the 1 Min Data)

Date & Time Dd/mm/yyyy hh:mm:ss format	Wind Speed (m/s)	Module Temp. (° C)	Ambient Temp. (° C)	Horizontal Irradiance (W/m²)	POA Irradiance (W/m²)	POA Radiation (kWh/m²)	Humidity(%)	Wind Direction(°)	Generation(kWh) (Source: TVM)	Explicit RemovalFlag* (0 or1)	Remarks

***** Explicit Removal Flag: 0 indicates time block considered; 1 indicates time block not considered.

PR Test Report shall be generated from the Raw Data (Sample Report provided in the Annexure) after data filtering as per criteria laid out in (2). The Report shall contain the signature of both representatives (site-in-charge & EPC Contractor).

Note: In case of multiple pyranomters/temperature sensors, the radiation and temperature data for the purpose of calculation of PR shall be derived from the average values from tilted pyranometer/temperature sensors.

Reports

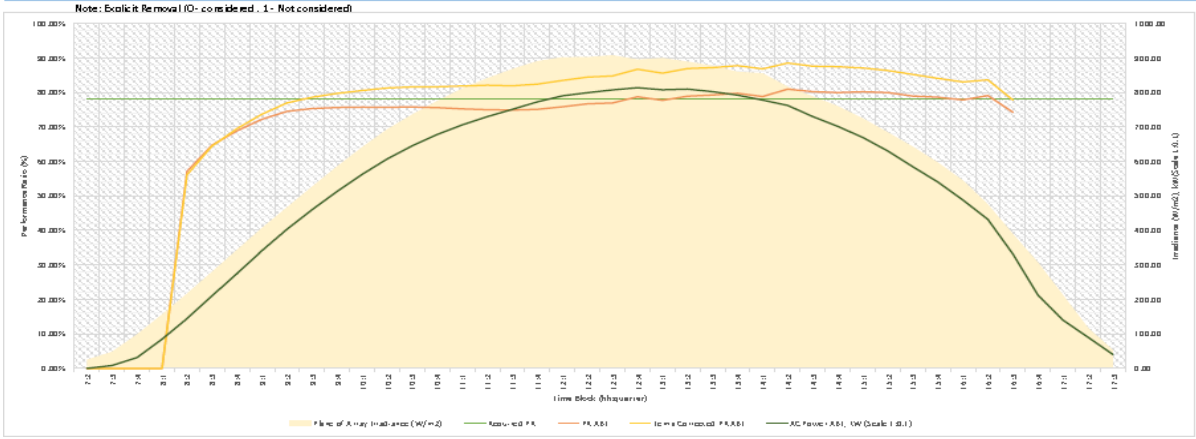
Sample Report for PR Test

PR Guarantee Test Report

Day	20-Nov-2016	Criteria	>200 Average POA Irradiance in a time block in W/m2
No. of Timeblocks considered	36 /42	Tot Gen	53694 kWh Source: ABT Meter at GSS
Plant PR for the day ABT	80.66%	Average PR (temp corrected) of 15 min time blocks where POA irradience is greater then 200W/m2 and not explicitly removed	
	(Guaranteed PR: 78%)		

Time Block (hh:Qtr)	Wind Speed (m/s)	Module Temp. (°C)	Ambient Temp. (°C)	POA Radiation (kWh/m2)	Plane of Array Irradiance (W/m2)	GHI (W/m²)	Humidity (%)	Wind Direction (°)	Generation ABT GSS (KWh)	AC Power ABT, kW (Scale 1:0.1)	PR ABT	Temp Corrected PR ABT	Explicit Removal
7:2	1.62	13.91	15.10	2.17	25.25	27.00	45.92	88.10	0.00	0.00	0.00%	0.00%	0
7:3	1.41	14.47	15.25	12.34	47.92	50.47	45.53	38.35	21.00	8.40	14.73%	14.10%	0
7:4	0.57	15.84	15.73	25.08	98.48	92.93	44.41	0.00	79.00	31.60	27.27%	26.24%	0
8:1	0.26	17.73	16.01	39.51	156.11	143.67	44.55	0.00	212.00	84.80	46.45%	45.07%	0
8:2	0.66	20.64	17.01	54.73	216.78	193.67	42.19	0.00	361.00	144.40	57.10%	56.08%	0
8:3	0.43	24.09	17.94	70.40	279.62	245.80	40.17	0.00	526.00	210.40	64.69%	64.45%	0
8:4	0.71	27.22	18.85	86.46	343.62	291.80	38.39	0.00	688.00	275.20	68.90%	69.52%	0
9:1	0.71	29.93	19.74	102.34	407.36	348.47	36.74	0.00	854.00	341.60	72.25%	73.71%	0
9:2	0.71	32.98	20.73	117.25	466.99	398.00	35.17	0.00	1009.00	403.60	74.51%	76.95%	0
9:3	0.80	35.60	21.52	132.29	527.14	445.27	33.94	0.00	1151.00	460.40	75.33%	78.61%	0
9:4	0.74	38.17	22.31	146.86	585.56	486.27	32.98	0.00	1283.00	513.20	75.64%	79.72%	0
10:1	0.87	40.55	23.23	160.77	641.34	516.87	31.86	0.00	1406.00	562.40	75.72%	80.54%	0
10:2	0.93	42.99	24.08	173.62	692.91	540.33	31.13	0.00	1518.00	607.20	75.70%	81.28%	0
10:3	0.99	43.78	24.78	184.38	736.02	559.67	30.67	0.00	1613.00	645.20	75.74%	81.57%	0
10:4	1.18	44.44	25.53	194.12	775.43	576.53	29.87	12.76	1695.00	678.00	75.60%	81.63%	0
11:1	1.05	46.52	26.17	203.12	811.43	593.60	28.97	0.00	1765.00	706.00	75.23%	81.87%	0
11:2	0.89	48.11	26.74	210.57	841.02	609.07	28.28	0.00	1824.00	729.60	75.00%	82.10%	0
11:3	1.51	47.95	27.61	217.05	867.66	624.60	26.97	0.00	1877.00	750.80	74.87%	81.92%	0
11:4	2.03	48.74	28.04	222.77	890.54	642.47	25.69	76.95	1932.00	772.80	75.09%	82.40%	0
12:1	1.61	49.61	28.91	225.54	902.04	656.13	24.24	0.00	1975.00	790.00	75.82%	83.47%	0
12:2	2.03	49.58	29.45	225.55	902.30	664.40	22.97	129.40	1998.00	799.20	76.69%	84.42%	0
12:3	2.34	49.79	29.73	227.09	907.75	672.60	21.62	131.02	2018.00	807.20	76.94%	84.75%	0
12:4	2.48	49.66	29.92	223.65	895.29	671.87	20.71	96.20	2034.00	813.60	78.74%	86.70%	0
13:1	2.10	49.70	30.20	224.96	899.51	670.93	18.75	0.00	2019.00	807.60	77.71%	85.57%	0
13:2	2.32	49.80	30.31	222.11	889.25	665.80	18.11	22.42	2024.00	809.60	78.90%	86.92%	0
13:3	2.59	49.39	30.42	219.07	877.23	649.13	17.75	219.19	2005.00	802.00	79.24%	87.17%	0
13:4	2.22	49.55	30.70	215.00	859.72	630.67	17.39	0.00	1980.00	792.00	79.73%	87.76%	0
14:1	1.87	49.88	30.98	213.62	855.38	620.80	16.27	0.00	1944.00	777.60	78.79%	86.83%	0
14:2	2.27	47.80	31.28	203.86	816.52	584.27	16.13	19.15	1906.00	762.40	80.95%	88.51%	0
14:3	2.30	47.34	30.99	196.95	788.89	548.20	16.46	38.30	1825.00	730.00	80.23%	87.58%	0
14:4	2.05	47.88	31.01	189.95	760.16	520.20	16.53	7.33	1754.00	701.60	79.95%	87.45%	0
15:1	1.75	45.99	31.44	180.73	724.65	484.80	15.75	0.00	1674.00	669.60	80.19%	87.10%	0
15:2	2.30	44.51	31.33	170.69	684.26	442.27	15.51	95.39	1576.00	630.40	79.94%	86.34%	0
15:3	2.10	44.35	31.19	160.33	642.47	402.40	15.57	28.93	1462.00	584.80	78.95%	85.21%	0
15:4	2.33	41.86	31.19	148.67	596.65	358.47	15.41	45.73	1350.00	540.00	78.62%	84.06%	0
16:1	1.91	41.25	31.19	135.70	544.70	311.80	15.33	90.91	1220.00	488.00	77.84%	83.02%	0
16:2	2.37	38.99	31.12	118.23	475.45	255.73	14.96	5.47	1080.00	432.00	79.09%	83.62%	0
16:3	2.57	36.66	30.95	96.68	389.67	195.27	15.01	86.82	829.00	331.60	74.24%	77.79%	0
16:4	1.60	34.83	30.62	70.86	306.83	143.86	15.44	76.91	531.00	212.40	64.88%	67.50%	0
17:1	1.56	32.61	30.19	52.45	212.88	92.47	15.59	63.97	350.00	140.00	57.78%	59.58%	0
17:2	1.75	29.57	29.68	26.61	117.56	48.14	15.94	103.66	226.00	90.40	73.53%	74.91%	0
17:3	0.84	27.22	28.80	4.19	52.66	21.40	16.82	0.00	100.00	40.00	206.71%	208.59%	0

Note: Explicit Removal (0- considered , 1 - Not considered)



Remarks: [to be recorded, if any]

Annexure – D

Plant Documentation, Commissioning and Test Procedure

TABLE OF CONTENTS

1 INTRODUCTION

This document lays down the procedures, requirements and templates for conducting commissioning tests and inspection of the Plant Facilities after installation and for subsequent re-inspection, maintenance or modifications in accordance with the Tender Specifications, IEC 62446 standard (Part 1: Grid connected systems – Documentation, commissioning tests and inspection)- and industry best practices.

2 CODES AND STANDARDS

The Testing and Commissioning Procedures shall, in general, comply with the following standards:

1. IEC 62446 standard (Part 1: Grid connected systems – Documentation, commissioningtests and inspection).
2. IEC 60364-6:2016 - Low voltage electrical installations - Part 6: Verification.
3. IEC 61829:2015: Photovoltaic (PV) array - On-site measurement of current-voltage characteristics.
4. IEC 60904-4:2019 Photovoltaic devices - Part 4: Reference solar devices - Procedures for establishing calibration traceability
5. IEC TS 60904-1-2:2019 - Photovoltaic devices - Part 1-2: Measurement of current- voltage characteristics of bifacial photovoltaic (PV) devices
6. IEC 62305-3– Protection against lightning - Part 3: Physical damage to structures and life hazard
7. IS/IEC 61557 : Part 2 : 2007 - Electrical safety in low voltage distribution systems up to 1000 V ac and 1500 V dc - Equipment for testing, measuring or monitoring of protective measures: Part 2 insulation resistance.

3 COMMISSIONING

3.1 GENERAL

3.1.1 Objective

The Commissioning Procedure defined in this document aims to:

- Verify that the power plant is structurally and electrically safe
- Verify that the power plant is structurally and electrically robust to operate for the specified lifetime of a project
- Verify that the power plant operates as designed and its performance is asexpected.

3.1.2 General Requirements before Starting the Commissioning Process

- The modules shall be stabilized (sufficiently exposed after 200 kWh/m² reaching the PV plane)
- The tests shall be conducted under stable weather conditions
- The process shall be witnessed by the Purchaser or their duly appointed representative.
- Soiling losses shall not be accounted for in the assessment of Results. Therefore, adequate Module cleaning exercise shall be undertaken prior to commencement of Commissioning process.
- The following equipment shall be used during the commissioning process (Refer SectionVII B:Technical Specifications for testing instruments):
    - Earth resistance tester
    - IV curve tracer
    - Insulation tester
    - Digital multimeter
    - Clamp meter
    - Infrared camera
    - Digital lux meter
    - Electroluminescence camera, power supply and accessories
- All testing equipment shall possess valid calibration certificate issued

from approvedlaboratories.

4 COLD COMMISSIONING

4.1 DC COMMISSIONING

4.1.1 Visual Inspection

The visual inspection shall be conducted on 5% of the system split in subareas equally distributed in the field. Unless otherwise specified, Approved Cat I Drawings shall be referred for correctness/verification. At least following aspects shall be verified visually on the DC side:

- Sizing of the DC fuses for running conditions, for the maximum voltage and the maximumcurrent.
- Sizing of the string cables including overcurrent protection considering the current carryingcapacity under operating conditions
- Cables protected against mechanical damage
- Functionality of the main DC switch
- Fixation of the modules to the mounting structure
- Termination of the cables to the inverter
- Where the PV system includes functional earthing of one of the DC conductors, the functional earth connection shall be specified and installed to the requirements of IEC 62548.
- Laying and installation of cables
- Fixation of the grounding electrodes
- Grounding of all conductive parts and connected to the equipotential bonding system ofthe PV plant
- The torque values in the mounting structure, combiner boxes, bars and joints shall matchthe manufacturer specifications
- Where protective earthing and/or equipotential bonding conductors are installed, theyshall be parallel to and bundled with the DC cables
- Electrical circuits and devices shall be labelled.
- The PV modules shall be in a good condition (no visible serial defects such as yellowing,delamination, scratches, etc.).

- Functioning of fire protection equipment.

4.1.2 PRE-ENERGIZING TESTS

4.1.2.1 Measuring instruments and monitoring equipment and methods shall be chosen in accordance with the relevant parts of IEC 61557 and IEC 61010. The following tests shall be carried out on the DC circuit forming the PV array in accordance with a Sampling Plan:

- Electrical Continuity test: This test shall be performed on the earthing and/or equipotential bonding conductors, in the PV array field. Connection of such conductors to earthing pit shall also be verified .
- Polarity test: Polarity of DC cables shall be verified. After verifying the correctness of polarity, marking on cable shall be checked for correctness
- Note: Polarity test shall be performed before closing the switches or string overcurrent protective devices are inserted
- Combiner box test: The purpose of this test is to ensure all strings are connected correctly to the combiner box. The test procedure is as follows and shall be performed before any string fuses / connectors are inserted for the first time:
  - i) Select a volt meter with voltage range at least twice the maximum system voltage.
  - ii) Insert all negative fuses / connectors so strings share a common negative bus.
  - iii) Do not insert any positive fuses / connectors.
  - iv) Measure the open circuit voltage of the first string, positive to negative, and ensure it is an expected value.
  - v) Leave one lead on the positive pole of the first string tested, and put the other lead on the positive pole of the next string. Because the two strings share a common negative reference, the voltage measured should be near-zero, with an acceptable tolerance range of ±15 V.
  - vi) Continue measurements on subsequent strings, using the first positive circuit as the meter common connection.
  - vii) A reverse polarity condition will be very evident if it exists – the measured voltage will be twice the system voltage.

- String open circuit voltage test, V_{oc} (under stable weather conditions): The purpose of this test is check the modules connection in string as per the design. The V_{oc} of PV string should be measured using suitable measuring device before closing any switch or string overcurrent protective devices, where fitted.

  The measured string V_{oc} will be assessed to ensure it matches the expected value (typically within 5 %) in one of the following ways:

  a) Compare with the expected value derived from the module datasheet or from a detailed PV model that takes into account the type and number of modules and the module cell temperature.
  b) Measure Voc on a single module, then use this value to calculate the expected value for the string.
  c) For systems with multiple identical strings, voltages between strings can be compared.

- String circuit current test, Isc (under stable weather conditions): The purpose of this test to check the correctness of system, operational characteristic and PV array wiring. These tests are not to be taken as a measure of module / array performance. The testprocedure will be as follows:

  i) Ensure that all switching devices and disconnecting means are open and that all PV strings are isolated from each other.
  ii) Create a temporary short circuit into string under test by using any of the following method:

  (a) use of a test instrument with a short circuit current measurement function (e.g. a specialized PV tester);
  (b) a short circuit cable temporarily connected into a load break switching device already present in the string circuit;
  (c) use of a “short circuit switch test box” – a load break rated device that can be temporarily introduced into the circuit to create a switched short circuit.

  iii) Measure the short circuit current (Isc) using a suitably rated measuring instrument.
  iv) After taking the reading, interrupt the short circuit using a suitable

load break switching device and check the zero value of current before changing any other connections.

v) Compare the measure value of Isc with the expected value. For systems with multiple identical strings, measurements of currents in individual strings shall be compared. These values should be the same (typically within 5 % of the average string current). Note: An I-V curve test can be performed as an alternative to this test (see 4.3).

- Functional tests: The following functional tests shall be performed:

  i) Switchgear and other control apparatus shall be tested to ensure correct operation and that they are properly mounted and connected.

  ii) All inverters forming part of the PV system shall be tested to ensure correct operation. The test procedure should be as defined by the inverter manufacturer.

  Functional tests that require the AC supply to be present (e.g. inverter tests) shall only be performed once the AC side of the system has been tested.

- Insulation resistance of the DC circuits: Test procedure to conduct this test will be as follows:

  i) Before commencing the test adopt the following safety measure to avoid any potential shock hazard
     (a) Isolate the testing area.
     (b) Do not touch any metallic surface, module backsheet or the module terminals when performing the insulation test.
     (c) Appropriate personal protective clothing / equipment should be worn for the duration of the test.

  ii) Isolate the PV array from the inverter (typically at the array switch disconnector)

  iii) Disconnect any piece of equipment that could have impact on the insulation measurement (i.e. overvoltage protection) in the junction or combiner boxes.

  iv) The insulation resistance test device shall be connected between earth and the array cable(s) or combiner bus bar. Connections can

be made between earth and array negative followed by a test between earth and array positive or between earth and short circuited array positive and negative.

v) Follow the IR test device instructions to ensure the test voltage and readings in megaohms. When the system voltage (Voc at STC X 1.25) is higher than 500V, the test voltage shall be 1,000V and the minimum insulation resistance 1 MΩ.

vi) Ensure the system is de-energized before removing test cables or touching any conductive parts.

4.1.2.2 SAMPLING PLAN:

At least 2 strings from 2 SMUs shall be randomly chosen by the Purchaser connected to each Inverter.

4.2 AC COMMISSIONING

4.2.1 VISUAL INSPECTION

The visual inspection shall be conducted on 5% of the system. In general, the requirements specified in the IEC 60364-6 -6.4.2 apply. At least following aspects shall be verified visually on the AC side:

4.2.1.1 General requirements

- Protective requirements against electric shock
- Protection against fire and heat
- Choice, setting, selectivity and coordination of protective and monitoring devices
- Sizing of cables regarding voltage drop and ampacity as per approved Drawings.
- Sizing of protective and monitoring devices as per approved Drawings
- The circuit breakers are correctly located
- Selection, location and installation of suitable isolating, overvoltage

protective devices and switching

- The equipment and protective measures are appropriate for the external influences and mechanical stresses
- The diagrams, warning notices or similar information attached to the wall inside the inverter housing or the control room
- Proper fixation of the cables to the collector bars in the AC combiner box
- Proper labelling of all electrical circuits and devices including the neutral conductor and protective conductor as well as correct connection of single pole devices to the phase conductors
- Adequacy of termination and connection of cables and conductors
- The warning labels and technical documentation physically displayed
- Selection and installation of earthing arrangements, protective conductors and their connections
- The existence and correct use of protective conductors and protective equipotential bonding conductors (PEB)
- Measures against electromagnetic disturbances implemented
- Easy access to the operational devices for maintenance
- Any exposed conductive parts connected to the earthing system
- The RCD type has been selected according to the requirements of the IEC 62548
- The isolation means of the inverter on the AC side are functional and correctly sized
- The fire protection requirements according to the approved design shall be given

4.2.1.2 Requirements for the inverter

- Installation as per manufacturer's instructions and compliance with IEC 62548
- Inverters properly fastened to the ground

- Inverter properly earthed
- Inverter incoming/outgoing cables properly isolated, labelled and connected
- The connections for phase sequence L1, L2, L3 and N in the correct order
- All cable terminations properly done
- Nameplate data. The minimum requirements for the production of a name plate are –
    - name and origin of the manufacturer; –
    - model or type name;
    - serial number;
    - electrical parameters: Vdcmax, Vmppmin, Vmppmax, Idcmax, Pac,r, Vac,r, f r , Iacmax;
    - degree of protection;
    - overvoltage category;
    - safety class.
- The displays - check / readout show plausible results
- The filters are clean and properly maintained
- The cooling outputs of the inverters are free from obstruction
- The DC circuit breaker is functional
- The DC insulation monitoring correctly installed
- The fuses at the DC entrance correctly sized
- The location of the inverter(s) in the field matches the approved design
- Protection against self-loosening of clamps and screws
- The ~~string~~ inverter anchored to the mounting structure
- The mechanical assembly is robust
- The inverters are fixed to non-flammable mechanical elements.

4.2.2 PRE-ENERGIZING TESTS

Measuring instruments and monitoring equipment and methods shall be chosen in accordance with the relevant parts of IEC 61557 and IEC 61010. The following tests shall be carried out on the AC circuit forming the PV array:

- Continuity of conductors. The requirements in IEC 60364-6:2016 – 6.4.3.2 apply
- Insulation resistance of the electrical installation. The requirements in IEC 60364-6:2016– 6.4.3.3 apply
- Insulation resistance testing to confirm the effectiveness of protection by SELV, PELV or electrical separation. The requirements in IEC 60364-6:2016 – 6.4.3.4 apply
- Insulation resistance/impedance of floors and walls. The requirements in IEC 60364- 6:2016 - 6.4.3.5 apply
- Polarity test. The requirements in IEC 60364-6:2016 - 6.4.3.6 apply
- Testing to confirm effectiveness of automatic disconnection of supply. The requirements of the IEC 60364-6:2016 – 6.4.3.7 apply
- Testing to confirm the effectiveness of additional protection. The requirements of the IEC 60364-6:2016 – 6.4.3.8 apply.
- Test of phase sequence. The requirements of the IEC 60364-6:2016 – 6.4.3.9 apply
- Functional tests. The requirements of the IEC 60364-6:2016 – 6.4.3.10 apply
- Voltage drop. The requirements of the IEC 60364-6:2016 – 6.4.3.11 apply

4.2.3 ADDITIONAL PRE-ENERGIZING TESTS

All of the below tests shall be conducted in accordance with the supplier’s installation / commissioning manuals.

4.2.3.1 Distribution boards and combiner boxes Site testing on distribution boards shall include:

- Mechanical functional test of all components including mechanical interlocks
- Electrical functional test of all control and protection wiring against the

approvedswitchgear schematics

- Power frequency overvoltage test (flash test) on the switchgear including circuit-breakersin the test circuit
- Low resistance duct or test on the switchgear including circuit-breakers in the test circuit
- Visual inspection
- Verification of earthing

4.2.3.2 Inverters Site testing on inverters shall include:

- Full test procedure as defined by the inverter manufacturer
- A full mechanical functional test of all components including mechanical interlocks
- Verification that the inverter operational parameters have been programmed to localregulations
- Electrical functional test of all control and protection wiring against the approved switchgear schematics as per approved MQP/FQP
- Insulation resistance test and earth residual current monitoring test
- Anti-islanding functionality
- High Voltage overvoltage test
- SCADA and metering calibration & functionality test

4.2.3.3 HT Switchgear

Site testing on outdoor circuit-breakers shall include:

- Functional check of all wiring, interlocks, auxiliaries and pressure devices
- Timing test and travel curve
- Visual inspection

4.2.3.4 LV/MV transformers

Transformer commissioning shall include:

- Visual inspection, alignment, earthing and labeling
- Functional check of all wiring against the approved transformer schematics
- Testing and calibration of all transformer protection and monitoring devices
- Insulation resistance test
- Functional test of off-circuit/on Circuit tap changer and check of the continuity of all windings

4.2.3.5 Substation/Power Transformers

- Ratio measurement on all tap changer settings
- Winding resistance measurement on highest, lowest and nominal tap settings
- Insulation resistance between all windings, and each winding to earth
- Insulation resistance core-to-earth
- Oil sample tests: breakdown strength, moisture content, and dissolved-gas content
- Transformer differential protection scheme testing

4.3 CURVE TESTING

The requirements of the IEC 62446-1:2016 – 7.2 apply. Following normative references shall beconsidered while performing the IV curve test:

- IEC 61829:2015 Photovoltaic (PV) array - On-site measurement of current-voltagecharacteristics
- IEC 60891:2009 Photovoltaic devices - Procedures for temperature and irradiance corrections to measured I-V characteristics
- 2 % of the module strings shall be measured. If $\Delta P_{stringN}>5\%$, all the modules within that string shall be I-V characterized. Modules with $\Delta P_{N}>5\%$ shall be replaced. If more than 5% of the measured strings of the first sample show

ΔP_N>5%, another 2% shall be inspected. If more than 5% of the measured strings in the second sample show ΔP_N>5%, another 5% shall be inspected. If more than 5% of the measured strings in the third sample show ΔP_N>5%, another 10% shall be inspected. If more than 5% of the measured strings in the fourth sample show ΔP_N>5%, another 10% shall be inspected. The reference power value is the flash list value minus the light induced degradation (LID) value in the datasheet/module warranty.

5 HOT COMMISSIONING

5.1 INFRARED INSPECTION

Following normative references apply:

- PV array infrared camera inspection procedure **(**IEC 62446-1:2016 - 7.3) and IEC 62446-3 TS Ed.1.0 - Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance - Part 3: Outdoor infrared thermography of photovoltaic modules and plants (draft).
- The infrared inspection shall be applied both to the PV modules and the BOS components.

  The inspection sample will depend on the project size and shall be agreed with the Purchaser. Thefollowing values serve as an orientation:
- Large scale ground mounted PV plants
  - PV modules: 100%
  - Inverters: 100%
  - Combiner boxes: 100%

ACCEPTANCE CRITERIA

The following conditions shall be met simultaneously:

- 0.2% or less of the inspected modules show thermal gradients at the cell level of T > 10 K
- 0.2% or less of the inspected modules show thermal gradients at the junction box

level of T > 10 K

- 0.2% or less of the inspected modules show inactive cell strings
- No PID is detected
- All module strings are connected and producing
- All inverters are connected and producing

5.2 INVERTER AVAILABILITY TEST

5.2.1 Calculation of the Operation Time

It shall be calculated on inverter level. The operation time starts as soon as the inverter switcheson. Therefore only the logged irradiation values during the operation time of the inverter shall beconsidered. Irradiation values logged before or after the inverter running time shall be disregarded.

5.2.2 Calculation of the Downtime

The downtime relevant for the availability calculation is any time in which a part or a subpart of the system is not operational. The outage periods shall be considered again on inverter level. Only complete outages shall be taken into consideration. System black-out periods due to following reasons shall not flow into the calculation (i.e. excluded events):

- A failure in the distribution grid or the transformer substation, making it impossible totransmit the generated power
- Solar radiation below the level needed to obtain the minimum operating voltage to start the inverter operation
- Causes of Force Majeure.
- Occurrences of anomalies in the power supply system (frequency differences or voltage surges) that trigger the protective systems of the plant or the limit settings of the inverter.

Any forced disconnection shall be documented and recorded.

Acceptance criteria

The system availability shall be at least 99% during the testing period.

5.3 SINGLE AXIS TRACKER AVAILABILITY TEST (IF APPLICABLE)

The tracker availability test shall be carried out in parallel to the inverter availability test and shallhave the same duration. During the test, all trackers shall follow the sun according to the angles established in the tracking mechanism. A loss of availability shall be considered when the angle of inclination of one or more trackers deviates by more than 2° from the theoretical angle. The angles of inclination of each tracker shall be recorded with a resolution of 1min via the SCADA system.

5.4 SCADA AND WEATHER STATION RELIABILITY

5.4.1 Visual Inspection

- Installation of the communication system architecture diagram according to thespecifications
- Functional Tests conducted during FAT for Pre-Dispatch Inspection shall be repeated.
- SCADA shall be linked to all protection relays, disturbance recorders and other substation equipment using the communications protocol
- Visual check on the assembly of all joints and on the as-installed condition of all components, including:
  - The irradiation sensor is not shaded and is installed at the correct tilt angle andunder CCTV coverage.
  - Ambient temperature and module temperature sensor are installed properly (Reference IEC 61724)
  - Mechanical anchorage of the sensors is robust
- Complete calibration certificates of all the instruments shall be provided

6 BATTERY ENERGY STORAGE SYSTEM

6.1 VISUAL INSPECTION

Before energizing the BESS, following visual checks shall be made to check the required designcompliance:

- Installation of protective cover for live, hot and cold parts, and the adequate

distance from theperson;

- Installation of fence, wall, locking system of doors and access panels, and notice boards
- Installation of ventilation system;
- Installation of firefighting system;
- Installation of lightning protections devices.
- Wiring
  - All wiring shall be continuous and without splices.
  - Wiring that may be exposed to mechanical damage are placed in conduit or armoured.
  - Wires have permanent and durable identifying labels or markings on both ends.
  - Control and instrumentation wiring shall be separated from power and high-voltage wiring by use of separate compartments or enclosures or by use of separate wireways and appropriate barrier strips.
  - BESS and PCS control and instrumentation system wiring shall be bundled, laced, and otherwise laid in an orderly manner.
  - Cable systems do not block access to equipment by personnel. There are no exposed current-carrying or voltage-bearing parts.

6.2 CONTINUITY TEST

Continuity of power, control and auxiliary circuit in the system shall be verified through visual inspection,continuity tester and insulation resistance test.

Phase sequence and terminal marking shall also be verified with drawing and design documents.

6.3 EARTHING TEST

Following element to be check according to the design and applicable standards:

- Proper connection of the earthing busbar to the local earthing busbar;
- Individual earthing connection of main equipment to the earthing busbar;
- Connection of earthing cables to structures via proper connectors to prevent corrosion from dissimilar metals.

6.4 INSULATION TEST

For low-voltage EES systems, the insulation resistance test and withstand voltage test shall be performed according to IEC 60364-6.

For EES systems exceeding 1 kV AC or 1,5 kV DC, the withstand voltage test shall be performed according to IEC 61936-1.

6.5 FUNCTIONAL TEST

6.5.1 START AND STOP TEST

Check start and stop operation of BESS system with the startup/shutdown command manually and automatically.

6.5.2 ALARMS FUNCTIONAL TEST

Alarms initiation from the BESS in case of following conditions:

- Emergency trip switch.
- Loss of the low-voltage AC or utility grid voltage.
- An AC circuit breaker trip (either side of transformer).
- Door interlock: Initiate shutdown when the door is opened (with appropriate provision for maintenance work). Interlocks shall be self-resetting.
- Smoke/fire alarm.
- Control logic trouble.
- A DC ground fault (simulated).
- Remote disable (no reset required).

- grid system faults (balanced and unbalanced; line-to-ground, line-to-line, and three-phase).
- Abnormal voltage
- Islanding condition.
- Protection or control scheme failures, including the following:
  - Failure of local interconnection protection system
  - Failure of critical breaker trip coil or interrupting device
  - Loss of DC supply

6.5.3 LOAD TRIPPING TEST

Check the interlock of BESS with the main

6.5.4 OPERATING CYCLE TEST

Check for any abnormalities such as rise in temperature, noise level and vibration in ESS system duringrated input and output power operation.

6.5.5 STORAGE SETTINGS

Verification of settings/control points and provision for modification of various set points and fixedoperation/control settings associated with the various control functions.

Operator Controls:

- Trip/reset for the BESS AC circuit breaker or contactor.
- Trip/reset for DC circuit breaker(s)/contactor(s).
- PCS on/off.
- Reset cut-out selector switch to disable remote or local reset signals.
- A selector switch to manually set the operating state (that is, the shutdown, disconnect, or operate state)and to have the control system set the operating state automatically.

- A selector switch to manually set the operating mode and to have the control system set the operating mode automatically.

6.5.6 COMMUNICATION TEST

Verified that measuring, alarm, fault indication, message and control and monitoring system operations are correct transmitted and received by the SCADA system.

6.6 SYSTEM RATING VERIFICATION

1. BESS rating including rated power, energy available at rated power, and the performance of the BESS associated with different performance metrics mentioned herein taken at the beginning of life shall be based on a set of ambient operating conditions specified by the BESS Original Equipment Manufacturer (OEM) for the Project site. The Contractor shall also provide an indication of how the performance of the BESS with respect to the metrics is expected to change over time, to account for time and use of the system, and report the same periodically.

   An energy capacity test shall be performed at the time of Commissioning, in accordance with procedure mentioned below and is intended to be used to determine the dispatchable energy capacity of the BESS at the time of commencement of Operation. In conducting the energy capacity test, the Contractor shall provide a detailed and documented charging procedure within the specifications of the BESS. The energy capacity tests conducted on the BESS shall be documented to allow for tracking performance degradation.

   Available/Dispatchable/Throughput energy shall be tested in accordance with the following procedure under the standard testing conditions specified in IEC 62933-2-1 (Cl. 5.1.3):

MEASUREMENT:

System shall be charged to the full available energy level. Subsequently, the BESS

(appropriate modular sub-unit thereof) shall be discharged and charged at rated power between the lower and upper SOC* limit (as recommended by the OEM for current application). Power during charge and discharge shall be recorded at regular intervals of time documented by the OEM to provide a statistically valid resolution. The associated energy input (Ei), including all BESS functional, parasitic and auxiliary consumption and energy output (Eo) of the BESS shall be calculated from the recorded power. Discharged energy should be recorded as per the readings in the ABT Meter(s) at the point of interconnection of the BESS with the Solar PV array,

* *SOC recorded, shall be as reported by the Battery Management System.*

The above process shall be repeated multiple times, with minimum rest period between charging and discharging, if so recommended, so as to record data for a specified no. of cycles (n). The reference performance test value for stored energy shall be calculated as the mean of the values of Eo and Ei as measured for discharge and charge respectively.

The procedure shall be repeated (one cycle each) with power levels at 75%, 50%, and 25% of rated power and documented.
Criterion: BESS stored Energy capacity shall be at least total energy dispatchable as specified in the Section V: Technical Specifications at rated Power at the time of commissioning.

2. Round-trip energy efficiency (RtE, η) shall be determined as a function of the charge and discharge power and calculated using the following formula:

$$\eta_p = \frac{\sum Eo}{\sum Ei}$$

where,

∑Ei is the sum of Energy input to the BESS over n cycles

∑Eo is the sum of Energy output from the BESS over n cycles ηp is the Round Trip Efficiency at charge/discharge Power, P (expressed as a percentage of rated power)

Eo and Ei shall be determined as per point 1. above.

Criterion: ηp, as determined through the process described above shall be >80% at the time of commissioning.

Note: The tests are intended to be carried out over a continuous period. The value of n shall be at least 3 for 100% rated Power and 1 for 25%, 50% and 75% of rated power as per procedure laid down in Annexure B.

3. BESS Response time: shall be measured as the sum of the following two entities: 1-> The time elapsed between the instant when a command to change set point from rest to discharge is sent to the BESS (T0) and the instant when the BESS starts responding to the discharge command signal (T1), the BESS being in active standby state and 50% SOC at T0 i.e., T1- T0

   2-> Time elapsed in seconds between the instant the ESS output transitions from no discharge i.e. 0%(T1) to discharge and the instant it attains rated power capacity(T2) (or from no charge (T1) to charge state and the instant it attains rated charge rate(T2)) i.e. T2- T1

   RT = (T2- T1) + (T1- T0) **= T2- T0**

   Where T0 , T1 and T2 are timestamps:

T0 :	Instant when a command to change set point is received at BESS boundarybe identified in advance);
Data Format:	dd/mm/yyyy hh:mm:ss.00
T1 :	Instant when the BESS starts responding to the Command signal;
Format:	dd/mm/yyyy hh:mm:ss.00

T2 :	Instant when the BESS attains 100% of full discharge rate when dischargin full charge rate;
Format:	dd/mm/yyyy hh:mm:ss.00

ANNEXURE – E

MANDATORY SPARES

LIST OF TENTATIVE MANDATORY SPARES

S. No.	Equipment/Material	Quantity (for each type and rating)
1	PV Modules	0.5% of total supply
2	MC4 connectors (including Y-connector if used)	1% of total supply
3	String Combiner Box	1% of total supply
4	Power Conditioning Unit (As applicable)	
	(i) Central Inverter	As per OEM recommendation
	(ii) String Inverter	1% of total supply
5	Inverter Transformer	
	(i) HV bushing with metal parts and gaskets	1 set
	(ii) LV bushing with metal parts and gaskets	1 set
	(iii) WTI with contacts	1 set
	(iv) OTI with contacts	1 set
	(v) Buchholz relay	1 set
	(vi) Magnetic Oil Gauge	1 set
	(vii) Complete set of gaskets	1 set
6	HT Switchgear	
(i)	Vacuum pole	1 no.
(ii)	Closing coil	1 no.
(iii)	Tripping coil	1 no.
(iv)	Spring charging motor	1 no.
(v)	Relay	1 no.
(vi)	Meter	1 no.
(vii)	Current Transformer	1 no.
(viii)	MCCB	1 no.

(ix)	MCB	1 no.
(x)	Fuse	10% of total supply
(xi)	Indicating lamp	10% of total supply
(xii)	Rotary switch	10% of total supply
7	LT Switchgear	
(i)	MCCB	2 nos.
(ii)	MCB	2 nos.
(iii)	Fuse	10% of total supply
(iv)	Relay	2 nos.
(v)	Meter	2 nos.
(vi)	Current Transformer	2 nos.
(vii)	Voltage Transformer	2 nos.
(viii)	Indicating lamp	10% of total supply
(ix)	Rotary switch	10% of total supply
8	Solar Cable	1% of total supply
9	DC Cable	1% of total supply
10	AC Cable	1% of total supply
11	Communication Cable	1% of total supply
12	Control Cable	1% of total supply
13	Fuse	10% of total supply
14	Power Transformer	
(i)	HV bushing with metal parts and gaskets	1 set
(ii)	LV bushing with metal parts and gaskets	1 set
(iii)	WTI with contacts	1 set
(iv)	OTI with contacts	1 set
(v)	Buchholz relay	1 set
(vi)	Magnetic Oil Gauge	1 set
(vii)	Complete set of gaskets	1 set

(viii)	Pressure Relief Device	1 set
15	Switch Yard Spares	
	LA's, CT's (Metering and Protection), PT's (Metering and Protection), Isolator (one pole), Surge Arrestor, CB's (one pole),	1 set
16	Control and Relay Panel	
(i)	Swyd Control & Protection-Numerical protection Relay	1 set
(ii)	Swyd Control & Protection-Auxiliary Relay	1 set
(iii)	Swyd Control & Protection-Bay Control Unit (BCU)	1 set

Remarks:

a. Components mentioned in mandatory spares list, which are not applicable as per plant design consideration shall not be applicable.

b. All the mandatory spares may be kept at site with BBMB for use by the Contractor during AMC. Spares, if used, during AMC period shall be replenished by Contractor.

c. Contractor shall furnish the recommended spare list as part of design/drawing approval stage.

d. **In case any equipment or spares is not listed in the mandatory spares list but is required vitally for the operation of the plant, then the same shall be procured and provided by the contractor without any additional cost.**

Annexure – F

Annual Maintenance contract (AMC)

1 CONTRACTOR'S OBLIGATIONS

1.1. SERVICES

During the Term of the Contract, the Contractor shall perform the services in accordance with the AMC Scope of work as described in Annexure 1 (Scope of Work for AMC) (hereafter the "Services"),and also in accordance with the other conditions as prescribed related to the operational performance under Section - VII of the Bid Document:

1.2. The Contractor shall be deemed to have allowed correct and sufficient AMC Price to cover all its obligations under the Contract and to have allowed the necessary resources to enable it to perform the Services to the standards and in the manner required. The Contractor's failure to acquaint itself with or assess any applicable condition shall neither relieve it from the responsibility for performing its obligations under the Contract nor entitle the Contractor to any additional costs or any other relief.

1.3. To the extent the Contractor reasonably believes that it is necessary to enhance the overall performance or safety of the Plant, the Contractor may propose changes and improvements to the Plant [(including the software included with respect thereto)]. TheContractor shall ensure that no modification of any equipment, change of software settings or any other alteration of equipment shall:

(i) cause a negative impact on the performance of the safety and reliability of thePlant;

(ii) adversely impact the Warranties;

(iii) adversely affect the warranties provided by the Contractors under the Contract;

(iv) conflict with the requirements under the contract; or

(v) bypass any protective equipment.

(vi) Violates any National/International Trade & IPR laws.

1.4. Any proposed modifications/changes shall not be carried out without the approval of the original equipment manufacturer and the Purchaser and in accordance with Performance Standards, and Technical Specifications. The Purchaser shall be notified of the proposed modifications along with reasons

and technical note for such modifications, changes, alterations, etc., and after the modifications are carried out in accordance with the contract, an alterations activity report is to be shared with the Purchaser.

1.5. The Contractor shall, while rendering the Services, observe and comply with all the Applicable Laws, Good Solar Industry Practices, Ministry of New & Renewable Energy (MNRE), Ministry of Power (MoP), CEA, CERC, POSOCO, SLDC, STU, CTU, BBMB, Local DISCOM & TRANSCO guidelines and Performance Standards pursuant to the contract. The Purchaser shall have the right to, to the extent applicable to Services rendered by the Contractor, conduct monthly audit on Applicable Laws, health, safety and environment and all other relevant compliances. The Contractor shall provide all necessary access and supporting documents during audit which are applicable to the same. However, such audits will be planned well in advance in coordination with the Contractor, without affecting the site operation plan.

1.6. The Contractor shall provide and make available as necessary, all such skilled, experienced and qualified labour and other competent personnel as are required to perform the Services the Contractor shall ensure that its Personnel hold and continue to maintain all qualifications and licenses as required under Applicable Law to allow its Personnel to lawfully undertake performance of the Services and carry out the Contractor's other obligations under the contract. For works/services being performed on a continuous basis, the AMC Price shall be deemed to include and the Contractor shall obtain all required Government Approvals and bear any costs related thereto (including any shift or permitted overtime working, allowances, wage orders, night shift differentials, etc.).

1.7. The Contractor shall ensure that all its Personnel deployed for providing the Services have undergone adequate safety training and are appropriately skilled, qualified and experienced in performing the Services for solar farms of a similar size, scope and complexity as the Plant. The Contractor shall be responsible for all matters relating to labour relations, working conditions, training, employee benefits, safety programs and related matters pertaining to its Personnel. The Contractor shall at all times have full supervision and control over its Personnel and shall at all times maintain appropriate order and discipline among its Personnel.

1.8. Contractor shall be solely liable for and, at its sole cost and expense, arrange for the response, reporting, removal, transportation, disposal, investigation, cleanup or other remedial action (in all cases by licensed, insured, competent and professional contractors in a safe manner and in accordance with Applicable Laws) for any hazardous substances/waste existing at, in, on or under the Project.

1.9. The Contractor shall ensure availability of such Consumable Parts, Spare Parts, and Contractor's Equipment as may be necessary for the performance of the Services. The Contractor shall ensure that such Contractor's Equipment does not interfere with the operational or structural integrity of the Plant

1.10. The Contractor shall make available to the Purchaser the Reference Documents set forth in the Reference Documents and shall also provide the Purchaser with updates and revisions to the Reference Documents to the extent such updates and revisions are necessary and applicable to the performance of the Services. The Contractor shall provide the Purchaser with a latest version of update available of all the Reference Documents at the time of termination of the contract.

1.11. The Contractor acknowledges and agrees that other contractors of the Purchaser may be present at the Plant and it shall cooperate with such other contractors to allow the performance of its and their respective obligations to occur concurrently.

1.12. The Contractor shall through relevant agencies, if applicable, promptly investigate all accidents, damage or destruction, diagnosis, assessment of any potential consequential effects, estimating cost of repair, arranging for any remedial action required, making of any claims under the insurance policies and co-operating with and making reports required by the Purchaser or insurers.

1.13. The Contractor shall ensure that any Warranties provided under the Project Contracts are not invalidated or adversely affected by any act or omission of the Contractor during the period of such warranties.

1.14. The EMS and SCADA system shall be connected with the Plant and the Contractor shall make arrangements to provide monthly reports from the SCADA system. The Contractor shall arrange to connect the Plant to the

SCADA system operating at the Site enabling the remote operation of the Plant by the Contractor and to provide access to information pertaining to the Plant to the Purchaser's Representative at Site and SLDC. The Purchaser may collect the data generated by the SCADA system in respect of the Plant from the Contractor.

1.15. Upon the expiry or earlier termination of the contract, the Contractor shall arrange to provide and install an additionally extended terminal from the SCADA system at the Site to enable the Purchaser to continue to access data relating to the Plant, at no Additional Cost and upon such terms as may be mutually agreed between the Parties at such time of expiry or earlier termination of the contract as the case may be.

1.16. The Contractor shall further provide support for the operation and maintenance of any Purchaser installed scope including any third-party support as may be required by any relevant Government Authority.

1.17. The Contractor shall notify and communicate to the Purchaser about any condition which may cause any malfunction or failure in the Project.

2 FUNCTIONAL GUARANTEES/WARRANTIES

2.1. TECHNICAL AND FUNCTIONAL PERFORMANCE GUARANTEE

2.1.1 The Contractor shall be responsible for meeting the performance guarantee of the Plant facility as described in the contract.

2.1.2 In case of failure to meet the functional guarantees as described in section 2.1.1 above, the Contractor shall be liable to pay applicable Liquidated damages as described in theBid Document.

2.2. GENERAL REPAIR WARRANTY

2.2.1. All repairs and replacements performed by the Contractor pursuant to the contract, shall cover a warranty for defects in materials and workmanship for the entire terms of AMC contract.

2.2.2. The Contractor shall disassemble, repair or, replace and reinstall any defective Equipment parts and/or re-perform any defective work covered by this warranty, at nocost or expense to the Purchaser.

2.2.3. In the event that Contractor replaces Parts that failed during the final year of the Term in accordance with its obligations under the Contract, Contractor hereby warrants to Purchaser that the replacement Parts installed in the Plant Equipment during such period shall not fail due to a defect for one (1) year following the date of installation of such replacement Parts; provided that in no event shall any such warranty extend beyond earlier of (i) the period that is one (1) year following the expiration of the Term or (ii) the date of any termination of the contract for reasons other than attributable to Contractor. During such period, if the contract is not in effect for any reason other than being terminated by Purchaser for cause, Contractor's obligation will be limited to supplying all needed Parts on to the Site delivered basis. For the avoidance of doubt, this Clause may survive the termination or expiry (as the case may be) of the contract for a period of one (1) year.

2.2.4. During Defect Liability Period if any repair and replacement are done, then the warrantee of the equipment shall be extended from the data of such repair and replacement to the period of original equipment warrantee w.r.t. that replaced component.

2.2.5. Any latent defect which may not come to knowledge or discovered in the course of normal inspection/operation during one year from the operational acceptance but, may arise within a period of 5(five) years from LOA, shall be under warranty by free replacement/rectification.

2.2.6. The acceptance of the equipment by Purchaser shall in no way relieve contractor of his obligations under the contract.

2.3. GUARANTEE OF COMPLIANCE IN RELATION TO CURTAILMENT PLANS (ACOUSTIC OR OTHER CURTAILMENT PLANS)

The Purchaser may communicate to the Contractor any curtailment plans either linked to acoustic requirements; load management, or Applicable Law, the ("**Curtailment Plans**").

The Contractor shall ensure compliance with all Curtailment Plans provided by the Purchaser in accordance with Performance Standards and Technical Specifications. If either the Contractor or the Purchaser detects a variation with respect to the Curtailment Plans or in noise emission the Contractor will, at its own expense, characterize the problem, isolate the source of the problem and propose solutions to solve the problem to Purchaser (at the Purchaser' expenses in all cases other than cases where it's ascertained that the deviation was caused by a non-respect of the obligations under the contract).

3 PERFORMANCE STANDARDS

3.1 Contractor shall perform its obligations under the contract in compliance with the contract and otherwise, as applicable, in accordance with the following order of precedence (collectively, the "Performance Standards") as from time to time in force:

3.1.1 the Applicable Laws, and the requirements from the Grid Operator/SLDC;

3.1.2 the Permits and all the related documents;

3.1.3 the terms of the contract;

3.1.4 the functional Guarantee;

3.1.5 the Reference Documents including the manufacturers recommendations;

3.1.6 Purchaser's health and safety manuals and procedures and ESMP;

3.1.7 the Site Regulations;

3.1.8 the Equator Principles and the Equator Principles Requirements;

3.1.9 Good Solar Industry Practice;

3.1.10 Any relevant and reasonable instructions issued by the Purchaser, relevant to the scope of the contract, to the Contractor at least 15 days before the implementation of such instructions without any cost to the Contractor.

3.1.11 The terms of insurances directly relating to the Project and

3.2 If there is any inconsistency between the Performance Standards, [it shall be interpreted in the order of precedence listed above provided that(i) the application of a Performance Standard does not derogate, breach, contradict, obstacle or circumvent the application of a Performance Standards appearing above such standard in the above order of precedence, and, in addition, (ii) provided that this such application does not cause a breach of Performance Standards or the Parties shall discuss and agree upon the manner in which such conflict shall be resolved.

3.3 Notwithstanding any other provision in the contract, the Contractor shall have no responsibility or obligation:

(a) to save and to the extent that the Contractor is required to do so pursuant to the provisions of Additional Services, to ensure that the Plant complies with the requirements of Applicable Law, Permits, if and to the extent that the same are introduced or amended following the Commencement Date; or

(b) subject to Additional Services, to ensure that the Plant or the Plant (as a whole) complies with any noise or acoustic emissions requirements under Applicable Laws Permits.

Without prejudice to the foregoing, the Contractor is required to comply with the qualityof supply limits determined in accordance with the Applicable Law and the Contractor will be deemed to have knowledge of its content.

3.4 The Contractor shall not do or omit to do anything in the performance or

discharge of its obligations or the exercise of its rights under the contract or in breach of the contract,which would cause any breach of any of the terms of the Supply Contract, Works Contract, the Applicable Law, the Permits or the terms of any Permits or the Direct Contract, and should the Contractor be in breach of the Performance Standards, it shall, on demand of the Purchaser, indemnify the Purchaser against any direct Losses arising from a breach of this Clause by the Contractor, always subject to the aggregate liability cap of the Contractor (except as otherwise agreed herein).

3.5 If the Contractor is aware of a conflict between any of the above requirements, it shall inform the Purchaser accordingly and the Parties shall discuss and agree upon the manner in which such conflict shall be resolved.

4 ADDITIONAL SERVICES

Purchaser may, with respect to the Plant, request that Contractor perform work, provideservices, or supply other equipment or parts, not included within Services for the successful operation of the plant for the duration of this AMC Agreement. Any such requested service or supply that the Parties mutually agree to in writing shall, subject to any specific terms and conditions agreed with respect to such service or supply, bean "**Additional Service**".

5 SERVICE PERSONNEL

5.1 Contractor shall provide the Services and any Additional Services to be performed on Site using a sufficient number of suitably skilled, qualified and experienced (including any licensing, certifications or training required by Applicable Laws or the local transmission system operator) and adequately equipped and properly trained Personnel and/or Subcontractors, all appropriately skilled and experienced in their respective trades or occupations as may be reasonably necessary to fulfil its obligations hereunder in relation to the Services and Additional Services.

5.2 The Purchaser may request the Contractor to remove (or cause to be removed) any Person or Subcontractor employed on the maintenance of the

Plant, including the Contractor's Representative if applicable, who:

(i) engages in material or persistent misconduct or lack of reasonable care;

(ii) carries out duties incompetently or negligently;

(iii) fails materially to conform with any provisions of the Contract;

(iv) engages in conduct which is prejudicial to safety, health or the protection of the environment or in violation of any related Performance Standards or Applicable Laws;

(v) engages in conduct which might reasonably result in a breach of any provision of the contract and threaten public health, safety or security.

5.3 The Purchaser shall give notice to the Contractor of the same giving reasons and request the Contractor to replace such Personnel with a suitable candidate. The Contractor shall then as soon as reasonably possible but no later than seven (7) days upon receiving such notice from the Purchaser, Contractor will look in to the facts and claims of the case in all sincerity and deploy the required actions with the notice to thePurchaser.

5.4 Contractor shall have full supervision and control over its Personnel at the Site and shall maintain appropriate order and discipline among such personnel and shall cause any Subcontractor to maintain similar standards with respect to such Subcontractor's personnel at the Site.

5.5 The Contractor shall be responsible for all matters relating to labour relations, working conditions, training, employee benefits, employee drug testing in accordance with the Contractor's standard drug testing policy, safety programs and related matters pertaining to its employees and other Personnel engaged by the Contractor. The Contractor shall at all times have full supervision and control over its employees and other personnel engaged by it and shall at all times maintain appropriate order and discipline among its Personnel and shall cause any Subcontractor (or any subcontractor appointed by such Subcontractor) to maintain similar standards with respect to such Subcontractor's or any subcontractor appointed by such Subcontractor) employees and Personnel.

5.6 The Purchaser shall have the right, acting reasonably and following prior notification, to require the Contractor to remove from the Site any employee or Personnel of the Contractor or any of its Subcontractors (or any subcontractor appointed by such Subcontractor) engaged in activity which presents a risk of injury to persons or property at the Site.

6 SAFETY PRECAUTION

6.1 During performance of the Services, Contractor shall:

6.2 Comply with the safety standards and any safety procedures established by Contractor and same shall be approved by Purchaser after the Commencement Date;

6.3 Take all precautions required by Applicable Laws or Site Regulations, or otherwise according to the Performance Standards, for the health and safety of Contractor, its Affiliates and Subcontractors in the performance of the Services and any other Persons with temporary or perpetual access to the Site; [provided that the foregoing shall not limit Purchaser's responsibility for the safety of the Site as provided in Safety Precautions.

7 CONSUMABLES, SPARE PARTS, TOOLS AND EQUIPMENT

7.1 During the Term, Contractor shall provide equipment Spare Parts and Consumables and Tools, all as part of the Services and without Additional Cost to the Purchaser in accordance with the contract. Unless otherwise specified in the contract, the Contractor shall provide the Purchaser with an initial Spare Parts inventory. At the end of the Term or upon termination of the contract, the Supplier will replenish the equal quantity of the Spare Parts and Consumables and Tools as provided during the start of Contract.

7.2 CONSUMABLES AND TOOLS

Contractor shall supply Consumables and Tools to the extent required for performance of the Services. All Consumables provided by Contractor in the

performance of its Services, shall be compatible with the applicable requirements of the Reference Documents and Applicable Laws.

7.3 EQUIPMENT AND SPARE PARTS

Contractor shall supply Equipment and Spare Parts to the extent required for its performance of the Services and to maintain its obligations thereunder. The Contractor has the right to use renovated Equipment and Spare Parts. If the Contractor intends to use any refurbished Major Components, it will seek prior written approval from the Purchaser. Contractor's right to procure and use renovated / refurbished Spare Parts is subject to: (i) standards of good workmanship and Good Industry Practice; (ii) compliance with the applicable requirements of the Reference Documents; (iii) the Spare Part(s) are of the type being replaced or of another type insofar as same does not invalidate any applicable Type Certification of the Equipment (iv) the same warranty as equivalent new parts in terms of scope, nature and duration, (v) being renovated in conformity with the original equipment manufacturer's standards, and (v) being listed in the monthly maintenance report when used (track record of the Part).All such renovated/refurbished parts will be allowed by Purchaser only for any long lead items and also considering uninterrupted generation from the Project. However, the contractor shall immediately reinstate and order new items in order to replace the refurbished items provided for emergency purposes.

7.4 INSPECTION OF REPLACED PARTS

Contractor shall give to the Purchaser seven (7) days' notice of the time when the Replaced Part is being transported to the Site. Contractor shall permit Purchaser to inspect, any Part which is removed and replaced by a Spare Part pursuant to Consumables, Spare Parts, Tools and Equipment (such Part, a "Replaced Part"); provided however, any such inspection:

(i) must not include physical alteration or disassembly of such Replaced Part; and

(ii) must not result in any material increased costs to Contractor or delay Contractor in the performance of its obligations under the contract or any

Contract with, or warranty from, its Subcontractors, unless Purchaser agrees to cover such material increased cost.

7.5 TOOLS AND EQUIPMENT

Contractor shall furnish its service personnel with such tools, instruments, or materialstools and equipment and equipment as are necessary to perform the Services (the "**Contractor's Equipment**").

7.6 PRICES OF CONSUMABLES, SPARE PARTS AND CONTRACTOR'S EQUIPMENT

Subject to GST, Taxation & Import Duties, the AMC Price payable to Contractor under the contract shall include (in addition to other components included in such Price) the Costs of any and all Equipment, Consumables, Spare Parts and Contractor's Equipment required in connection with the performance of the Services.

7.7 RISK OF LOSS OR DAMAGE TO CONSUMABLES, SPARE PARTS AND CONTRACTOR'S EQUIPMENT

Contractor shall:

(i) be responsible at its own cost for the safe transportation and delivery to Site of all Consumables, Spare Parts, and Contractor's Equipment, in each case, required for the carrying out of the Services;

(ii) bear the risk of loss and damage to all such Consumables and Spare Parts during transportation to the Site and, thereafter up to the date of their incorporation by Contractor into the Plant; and

(iii) at all material times bear all risk in any and all Contractor's Equipment on or off the Site and whether remaining separate or temporarily attached to the Plant.

7.8 TITLE

Contractor shall retain title to any and all Contractor's Equipment on or off the Site and whether remaining separate or temporarily attached to the Plant until transfer of Title occurs. Title to any Spare Part (or other Part) or Consumables

provided by Contractor pursuant to the contract shall pass to the Purchaser upon:

(i) incorporation by Contractor in the Plant free and clear of any Lien; or
(ii) in the case of Additional Services, the date (if later) on which payment is made infull for such Spare Part or Consumable.

Title to any Replaced Part shall vest in Contractor upon such replacement, except if the Parties agree differently from time to time. In case of Additional Services, Purchasershall retain title to any Replaced Part.

8 COMMUNICATION AND REPORTING

During the Term, Contractor shall exchange information and reports on daily, weekly,monthly, quarterly and annual basis:

8.1 MONTHLY REPORTS

Contractor shall provide Purchaser with the Monthly Performance Report by no later thanthe fifth (5th) day from the end of each month.

8.2 EMERGENCY NOTICES

Upon obtaining actual knowledge thereof, Contractor shall promptly notify Purchaser verbally/written notice of any emergency or other hazardous condition or occurrence that Contractor reasonable believes could cause an immediate threat to the safe operation of the Plant and/or the safety of Persons.

If, by reason of an emergency arising in the course of, as a result of or otherwise in connection with and during the performance of the Services, any protective or remedial work is necessary as a matter of urgency to prevent damage to the Plant, the Contractor must immediately perform that work, provided that, Contractor shall have no obligation to perform such portions of the protective or remedial work which would be in violation with the Performance Standards, be a material breach of the contract or would cause a

threat to the safety of Persons or property or would otherwise not be reasonably practicable or possible; and provided further, that Contractor shall have no obligation toretrofit or upgrade the Plant except if otherwise agreed.

Without prejudicing the liability attributable to the Contractor for failure to comply with the provisions of the paragraph above, it is clarified that if the Contractor does not perform the protective or remedial works referred to above immediately, the Purchaser may appoint a Replacement Contractor to perform such works. If the work (or parts thereof) which were performed or caused to be performed by the Purchaser is work which the Contractor was liable to do at its own expense under the contract, the costs incurred by the Purchaser as a result of appointing a Replacement Contractor shall be [substantiated to the Contractor on an open book basis and be] considered due and payable to the Purchaser and Invoices and Payment and Set Off shall apply. It is further clarified that the impact of Replacement Contractor's actions shall not be considered asan Excluded Risk Event.

8.3 MEETINGS

A representative of each of Contractor and Purchaser (the "**Representatives**") shall meet (either at the Site or alternatively at such other location as may be agreed between the Parties) at quarterly intervals or such other period as is agreed especiallyfor the purposes set forth below:

(i) to discuss projected dates for performance of the Services and the AdditionalServices in the following quarter;

(ii) to discuss, the calculated Measured Average Availability of the Plant Facility for the past quarter under Annexure 2 [Functional Guarantees]; and

(iii) to review the Services and Additional Services performed in the past quarter.

8.4 ANNUAL CALENDARING OF MAINTENANCE SERVICES.

At the latest two (2) months after the beginning of commencement date, each year during the Term thereafter, the Contractor shall send to the Purchaser the projected dates and times for the immediately following period during which the

Contractor shall perform the Maintenance/Preventive Services on the Plant, with the parties using reasonable efforts to minimize any Plant downtime during Operational Sunny periods (the "**Maintenance Services Calendar**". Such Maintenance Services Calendar may be postponed by the Purchaser for 5 business days); provided, that the Maintenance Services Calendar shall be developed in accordance with the Operating Manual and the terms of the contract. The dates and times in the Maintenance Services Calendar may be amended thereafter by mutual Contract of the Parties. For clarity, the Maintenance Service Calendar shall include a maintenance plan established in accordance with the Maintenance Manual.

8.5 STATUS REVIEWS

As reasonably required, or requested by the Purchaser, the Representatives shall meet to discuss and review (i) the information contained in the Monthly Performance Reports, (ii) the availability of the Plant, (iii) any technical issues which may have arisen with respect to the performance, availability or maintenance and servicing of the Plant Equipment, (iv) Maintenance Services and Repair Services performed during the preceding calendar month, (v) any and all failures by a Plant equipment, and (vi) Maintenance Services to occur during the next following a calendar month.

9 CONTRACTOR'S PERMITS

Prior to the time in which such Permits are required in order to perform when the relevant Services and/or Additional Services, as applicable, are to be performed, Contractor shall obtain and maintain, as applicable, throughout the Term of the Contract all Permits (the "Contractor Permits") required by the Applicable Law, Good Solar Industry Practices, Performance Standards and Technical Specifications which should be issued in the name of Contractor or are otherwise attributable or necessary to the provision of the Services and/or Additional Services, other than such Permits as are required to be obtained by Purchaser pursuant to *Purchaser Permits*.

10 CONTRACTOR'S MANAGER

On or prior to the commencement of the Term, Contractor shall designate a duly qualified and experienced person to manage and administer the Contractor's activities and shall provide notice thereof to the Purchaser, to act as its manager and coordinator of the contract on Contractor's behalf (the "**Contractor's Manager**"). The Contractor's Manager shall not have authority to amend or modify the contract or accept any commitment which would have an effect on the contract. In case the manager is on leave with prior intimation to Purchaser, the deputy manager with equivalent qualification shall be provided at site by the Contractor

11 COOPERATION WITH OTHER SUBCONTRACTORS

Contractor acknowledges and agrees that the Purchaser or Other Subcontractors of Purchaser may be present at the Site and agrees, at no cost or expense to the Purchaser, to reasonably cooperate with such Other Subcontractors to allow the performance of its and their respective obligations to occur concurrently. Purchaser shall inform the Other Subcontractors of the clear demarcation of Contractor's scope of work so as to ensure non-interference in such work and operations by Purchaser's Other Subcontractors.

12 RESERVED RIGHTS

12.1 PLANT

To the extent Contractor believes, in its reasonable discretion, that it is necessary to enhance the overall performance or safety of the Plant, Contractor may propose to Purchaser changes and improvements to the Plant (including the software included with respect thereto) and implement such changes or improvements proposed after obtaining the prior written consent of the Purchaser; provided that such changes and/or improvements shall not (i) be in conflict with the Performance Standards**;** (ii) adversely impact the technical performance of the Plant or the safety of the Plant**;** (iii) adversely impact the Availability Warranty in Annexure 2 [Functional Guarantees] (iv) increase the cost of operating the Plant; (v) place the Purchaser in breach of the technical

requirements of the Power Purchase Contract; (vi) impair or vitiate any obligations of the Contractor under the contract; (vii) adversely affect the Supply Contract Warranties and the Works Contract Warranties; or (viii) result in non-compliance with the Type Certificate**.**

12.2 The Contractor shall only have the right to implement such changes or improvements if it has received the prior written consent of the Purchaser and such changes and improvements are carried out at no cost to the Purchaser and in accordance with Reserved Rights.

13 CERTAIN NOTIFICATIONS BY CONTRACTOR

13.1 Contractor shall, upon obtaining actual knowledge thereof, promptly give the Purchaser notice of:

(i) Any events or facts or observations that the Contractor believes could be reasonably likely:

(a) to have a material adverse effect on the operation of any of the Plant orthe performance of the Purchaser's obligations under the contract; or

(b) to cause an immediate threat to the safe operation of the Plant (or any Plant therein) and/or the safety of Persons; provided that, in the case of this Clause, the Contractor shall provide immediate verbal notice of such event, fact or observation to the Purchaser with notice to follow within three (3) Business Days);

(ii) Any actual or proposed event that the Contractor believes would be reasonably likely to have a material adverse effect on the operation of any of the Plant or the performance of either Party's obligations under the contract;

(iii) any (a) violation of Applicable Laws, or Permit, by the Contractor's agents, officers, directors, employees, representatives and Subcontractors, Purchaser or any Other Subcontractor; or (b) any notices of Liens (or claims of Liens) or investigations by Governmental Authorities related to the Plant;

(iv) any actual or contemplated change in Law that Contractor believes would be reasonably likely to have a material adverse effect on the operation of any of the Plant or the performance of either Party's obligations under the

contract.

13.2 If the Contractor does not comply with its obligations under Certain Notifications by Contractor, the Contractor shall, subject to Limitations of Remedies and Liability, indemnify the Purchaser for any loss the Purchaser may suffer as a consequence, including, without limitation, compensation pursuant to Purchaser's Obligations.

14 ASSIGNMENT AND SUBCONTRACTING

14.1 The Contractor shall not sublet, transfer or assign the contract or any part thereof without the prior written permission of Purchaser. The Contractor shall not subcontract any of the Services having a value of more than 30% of the AMC Price of the concerned year, except upon the Purchaser's advance written approval of the subcontracting of such works. Such approval shall refer to the specific identity of the Subcontractor and to the scope and terms of the subcontract. In any event, the Contractor shall not subcontract all, or materially all of the AMC Services or the ultimate supervision of the performance of such services.

14.2 The Contractor agrees and acknowledges that any review, by approval of, or failure to approve, or rejection by the Purchaser as to any Subcontractor shall not relieve the Contractor of any of its obligations under the contract, and the Contractor shall be liable hereunder to the same extent as if any such Subcontract had not been entered into. The Contractor shall at all times ensure and cause the Subcontractors not to commit any act or omission which could release, void, impair or waive any guarantee or warranty on the Plant or any part thereof.

14.3 The Contractor shall supervise and direct the work of all Subcontractors and be fully responsible for the performance of the Subcontractors and to the methods, techniques, sequences and procedures of, and for coordinating the work of the Subcontractors and to the acts and omissions of all Subcontractors and their employees, directors, officers, advisors, agents and representatives, and those of their subcontractors ("Subcontractors' Parties). With regard to any Subcontract and Subcontractor's Parties, in particular, Contractor shall ensure

that all wages, labor, health and safety and social related obligations are duly performed and timely discharged in accordance with Applicable Laws. It is agreed that if the responsibility of any such payments is transferred to the Purchaser pursuant to Applicable Law, the Purchaser shall have the right to adjust all such payments against the dues to the Contractor under the contract or otherwise recover the same from the Contractor under any other Contract. It shall be at Contractor's sole responsibility to ensure the payment and discharge of all its obligations with regard to the Subcontracts and shall indemnify the Purchaser and any Purchaser Indemnified Parties for any losses incurred by such parties in relation to the Subcontracts or to Subcontractor's Parties.

15 INSPECTION AND TESTING

15.1 The Contractor must provide the Purchaser, independent engineer, Grid Operator, Grid Administrator, and any other Contractor or Contractors employed by the Purchaser and their respective nominees, or other inspectors where required under the Applicable Law, the Permits, the Finance Documents and/or the Grid documents (collectively hereinafter referred to as the "**Project Parties**"), with access at any time to any place where the Services are being performed in order to inspect the progress and the manner of the Services.

15.2 The Project Parties and their respective nominees will have the right to examine and have access to documents relating to the Services.

15.3 The Contractor must carry out all tests and/or inspections of the Plant or Spare Parts in a lawful, professional, timely, safe and environmentally responsible manner as maybe necessary to ensure the safe, reliable, efficient, and optimal operation of the Plant and in accordance with the Performance Standards, Applicable Laws and Good Solar Industry Practice. All these tests and inspections are to be carried out at the Contractor's expense, as part of Services.

15.4 The Project Parties and their respective nominees are entitled to attend any test and/or inspection.

15.5 Whenever the Contractor is ready to carry out any test and/or inspection, the

Contractor must give at least ten (10) days' advance notice to Purchaser of such test and/or inspection and of the place and time. The Contractor shall make its best efforts to obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Project Parties to attend the test and/or inspection.

15.6 The Contractor must provide the Purchaser with a report of the results of such test and/or inspection within five (5) days after the completion of that test or inspection in question.

15.7 If the Purchaser and/or any of the Project Parties fail to attend the test and/or inspection, or if it is agreed between the Parties that the Purchaser and/or any of the Project Parties will not attend, then the Contractor may proceed with the test and/or inspection in the absence of the Purchaser's and/or any of the Project Parties' inspector and provide the Purchaser with a report in the approved form of the results.

15.8 If any Spare Parts or the Plant fails to pass any test and/or inspection, the Contractor must either rectify or replace those Spare Parts or repair the Plant and promptly repeat the test and/or inspection upon giving notice.

15.9 The Contractor agrees that neither the performance of a test and/or inspection of Spare Parts or the Plant, nor the attendance by the Purchaser's and/or any of the Parties' inspector nor the issue of any test report will release the Contractor from any of its obligations under the contract.

15.10 I**NSPECTION DURING THE TERM AND AT THE END OF THE TERM:**

During the Term, the Plant may be submitted to a general inspection performed by aContractor selected by Purchaser:

15.10.1 Inspection during the Term

From time to time during the Term, but not more than once every year (being specified that any additional tests and inspections instructed by the Purchaser under this Clause will be for the Purchaser's account unless the tests or inspections were necessary as a result of the failure of the Contractor to fulfil its obligations under the contract);

15.10.2 End of Contract inspection: six (6) to twelve (12) months before the end

of theTerm, at the convenience of the Purchaser.

Subject to the Purchaser's reasonable advance notice as to the date of such inspection, Contractor is required to attend and assist the Purchaser and the designated inspector in performing such tests, without additional cost.

15.10.3 The final report shall be sent to the Contractor by the Purchaser and if any defector damage found, same shall be rectified/replaced.

15.10.4 Without relieving Contractor from its obligations and without limiting Purchaser's ability to reasonably pursue the reliefs available to it, if applicable:

(i) Contractor shall, promptly following receipt of the report, submit to the Purchaser (a) a recovery plan to remedy all breaches, defects and malfunctions detected in the report for which the Contractor is liable and shall perform such remedial actions without delay, and (b) provide detailed measures to be put in place to prevent such defaults from recurring;

(ii) if the Contractor fails to timely complete all remedial actions before the end of the Term, the Purchaser shall be entitled, at Contractor's cost and risk, to employ a Replacement Contractor to perform the works.

16 HAZARDOUS SUBSTANCES AND HAZARDOUS SITE CONDITIONS

16.1 Contractor shall not, nor shall it permit any other Person to bring any Hazardous Substances on the Site, other than Hazardous Substances to be used by Contractor or any Subcontractor in a manner that:

(i) does not violate any Applicable Laws, or Permits; and

(ii) is consistent in quantity and with Good Solar Industry Practices for operating and maintaining solar energy conversion plants, such as motor fuels, solvents and lubricants (collectively, "**Permissible Materials**").

16.2 Contractor shall bear all responsibility and liability for:

(i) any Hazardous Substances that are not Permissible Materials belonging to the Contractor or present on site; or

(ii) the handling of, or failure to handle, Permissible Materials in violation of

Applicable Laws or otherwise in any manner that constitutes negligence or willful misconduct by Contractor or any Subcontractor.

16.3 Contractor shall use Hazardous Substances in performance of the Services in accordance with the Performance Standards, Applicable Laws and Good Solar Industry Practices and shall not:

(i) utilize, or permit or cause any Subcontractor to utilize, on the Site such Hazardous Substances as are prohibited under Applicable Law from being used in India; or

(ii) import or use at the Site such Hazardous Substances as are prohibited under Applicable Law.

16.4 Contractor shall maintain a regularly updated log of all material safety data sheets for all hazardous substances used in connection with performance of the Services at or near the Site, which shall be available for Purchaser to review upon reasonable request. Contractor shall maintain an accurate record and current inventory of all hazardous substances used in performance of the Services at or near the Site, which record shall identify quantities, location of storage, use and final disposition of such hazardous substances.

16.5 Contractor shall arrange and agree for the disposal, transportation, reporting and certification (including provision of waste disposal vouchers and other certificates as required by Applicable Law or Permits) of Hazardous Substances, including waste disposal vouchers, brought onto and released at the Site by Contractor or its Sub Contractors, which are expected to include but not be limited to used oil, grease and ethylene glycol, to the extent required by Laws, in each case, by licensed, insured, competent and professional Contractors in a safe manner and in accordance with Laws. As between the Parties, Contractor shall be solely liable for any response, removal, investigation, clean-up or other remedial action required by any Laws related to any Contractor,

16.6 In the event Contractor encounters any Hazardous Substance or other

hazardous conditions at the Site that are inconsistent with the Performance Standard or would reasonably be expected to impact the performance of Contractor's obligations hereunder, Contractor shall promptly report the condition to Purchaser. In such event, Contractor shall stop work and remove, or take other actions necessary to remedy the hazards associated with, any Contractor Hazardous Substances such that Contractor can resume work.

16.7 The Contractor shall indemnify and hold harmless the Purchaser against any fine, penalty or third-party Claim incurred as a result of non-compliance by the Contractor with the terms of the contract, Applicable Laws, Good Solar Industry Practice and more specifically, with its obligations under Hazardous Substances and Hazardous Site Conditions.

17 PURCHASER'S OBLIGATIONS

During the Term, Purchaser shall perform the following obligations:

17.1 ACCESS

17.1.1 On and from the Commencement Date, Purchaser shall provide the Contractor (and its Subcontractors) full, free and safe Access to the Plant for the purpose of enabling Contractor to fulfil its obligations under the contract.

Notwithstanding the foregoing, the Contractor shall be required to perform any works (including obtaining permits for such works) related to the Access to the Site required for the delivery of any Spare Parts, if so requested by the Purchaser in writing, on the Time to time Basis.

17.1.2 The Purchaser shall give to the Contractor and the Contractor's personnel unrestricted Access to the Site to enable Contractor and the Contractor's personnel to carry out all elements of the Services at any time from the Commencement Date until the end of the Term. Such Access shall include the provision by the Purchaser of:

17.1.2.1 such keys or access codes as may be required by the Contractor to gain unhindered access to the Site (as the case may be);

17.1.2.2 Access to the access roads to and on the Site If there is any deviation, and such deviations are accepted by the transport contractor, then such deviations shall beaccepted by the Contractor.

Notwithstanding anything else contained in the contract all Access to the Site and Plant is subject to the applicable site safety, security and environmental requirements and Applicable Law (and the Contractor should comply with the same). The Purchaser will have the right to limit Access or expel any Person off the Site in case of them not fulfilling the Emergency plan of the Site, the Emergency plan of the Plant Facility.

17.2 PURCHASER'S PERMITS

Contractor, on behalf of the Purchaser, shall obtain and maintain all Permits and any Permits required by Applicable Law to be obtained in the name of the Purchaser in orderto (i) perform Purchaser's obligations under the contract and (ii) enable Contractor to lawfully access the Site at the point of entry to the Site and the Plant].

18 SITE REGULATIONS

Purchaser shall (directly or through a Subcontractor, advisor or agent) provide the Site Regulations and revisions thereof from time to time, and shall require the Other Subcontractors and their respective agents and employees to, (i) comply with the Site Regulations; and (ii) take all necessary precautions (as required by Applicable Law or otherwise) for the health and safety of all Persons (including Contractor's personnel) atthe Site.

19 CERTAIN NOTIFICATIONS BY PURCHASER

19.1 Purchaser shall, upon obtaining actual knowledge thereof, promptly give the Contractor,as soon as practicable, notice of:

19.1.1 any events or facts or observations that the Purchaser believes has determined that would:

(i) have a material adverse effect on the operation of any of the Plant or the performance of the Contractor's obligations under the contract; or

(ii) to cause an immediate threat to the safe operation of the Project (or any Plant therein) and/or the safety of Persons; provided that, in the case of this current Sub-Clause, the Purchaser shall provide as soon as possible verbal notice of such event, fact or observation to the other;

19.1.2. any (a) violation of Applicable Laws, including environmental Laws or the terms of any Permit, by Contractor or any Other Subcontractor or (ii) any notices of Liens (or claims of Liens) or investigations by Governmental Authorities related to the Project.

19.2 Failure to furnish notice pursuant to Certain Notifications by Purchaser shall not affect the Contractor's obligations to perform its obligations. Contractor.

20 PURCHASER'S OWNERSHIP OF ENERGY, EQUIPMENT, SPARES AND PROJECT BENEFITS

20.1 The Contractor acknowledges that ownership of the Energy or any benefits arising out of the operation of the Plant remains at all times, and in all circumstances with the Purchaser at all times and the Contractor has no legal or equitable title to or interest in the Energy or other benefit.

20.2 The ownership of all item supplied by the Contractor, including under Additional Services shall be transferred to the Purchaser at the end of the term of the contract:

(i) such items becoming a permanent part of the Plant against the mutually agreedpayment by both the parties

20.3 The ownership of any item (not including Energy or benefits arising out of the

operation of the Plant) supplied by the Contractor as part of the Services shall be transferred to the Purchaser upon such items becoming a permanent part of the Plant.

20.4 The Contractor agrees that any benefits, including any carbon credits, renewable energy certificates or similar royalty or credit that may arise as a result of having the Project undertaken belong to the Purchaser.

21 PRICE AND PAYMENT

21.1 TOTAL AMC COST

Commencing on the Commencement Date and for the remainder of the Term, Purchaser shall, in consideration of the Contractor providing the Services and its prior receipt of an invoice with respect thereto, pay in accordance with Invoices and Payment to Contractor an annual AMC cost in INR in equal quarterly instalments at the end of every quarter for each year till 5 (Five) years extendable for another 5 (Five) years in the amounts set forth in and payable in accordance with AMC Schedule of rates of the bidding documents for the plant facilities.

Against the successful AMC of the entire Plant Facility payment will be released on quarterly basis at the end of every quarter for each year till 5 (Five) years extendable for another 5 (Five) years.

The AMC of the plant will commence from the date of Operational Acceptance of the plants.

The Contractor acknowledges that the Total Annual AMC cost forms the sole and exclusive consideration and reimbursement due to the Contractor for the performance of the services included under the Services and Spare Parts and that the Contractor shall not be entitled to any additional amount for their performance, for whatever reason, including, amount others due to increased costs, changes in applicable GST, customs or duties (including, without limitation those set forth in GST, Taxation and Import Duties below), and except as may be specifically provided in the contract.

21.2 **PAYMENT OF AMOUNTS DUE TO THE CONTRACTOR:**

Amount shall not be considered as due and payable and the period for the payment of any Price stipulated under the contract shall not commence until the Contractor has duly fulfilled and delivered all obligations and deliverables required from the Contractor until the date of submission of the invoice for the payment to the Purchaser with relation to such invoice and/or within the period for which the Price included in the invoice are due.

22 INVOICES AND PAYMENT

22.1 Contractor shall submit Goods & Service Tax (GST) compliant invoices to Purchaser for the amounts due under Total Annual AMC cost above and for any other amounts that may be due under the contract.

22.2 The Total Annual AMC Cost shall be invoiced by the Contractor quarterly against the completion of concerned quarter and each invoice may be submitted by Contractor no later than the day after the completion of the quarterly period in question and, subject to the terms of the contract, shall be paid by the Purchaser no later thirty (30) days from the date of submission of the invoice along with all other requisite documents (If so required). The Purchaser shall make payments by transfer to the bank account designated from time to time and owned by Contractor or through Cheque. The payment of any invoice shall be subject to the Contractor submitting to the Purchaser the Monthly Performance Reports.

22.3 Additional Services may, for purposes of this Invoices and Payment, be invoiced upon full and proper completion of each individual task and shall, subject to the terms of the contract be paid by the Purchaser within thirty (30) days from the date of submission of the invoice along with all other requisite documents (If so required).

22.4 To the extent permitted by Applicable Laws, if the amount of an invoice is disputed by the Purchaser, the Purchaser shall be entitled to withhold payment of the disputed amount for the next invoice (or part thereof), until the dispute is

resolved between the Parties under Law Dispute Resolution or otherwise. The Purchaser shall pay at the applicable time the undisputed amount of such invoice including any undisputed portion of the invoice item in dispute. Further, the Purchaser shall be entitled to withhold payment of any amount due to the Contractor, if, at the time, the Contractor is in breach of one or more of its material obligations in terms of the contract.

22.4.1 Subject to the provisions on the contract, the Contractor warrants that it has, and will be deemed to have, done everything that would be expected of a prudent, competent and experienced Contractor and in accordance with Good Solar Industry Practices in:

i) assessing all risks which it is assuming under the Contract; and

ii) ensuring that the **AMC Price** contain allowances to protect it against any of these risks eventuating and that it will not make a claim for an increase in the **AMC Price** if any of those risks eventuate.

22.4.2 Except for Liens arising out of a failure of the Purchaser to make any payment when due hereunder to Contractor or any other Person providing labour or services to the Project under Contract to the Purchaser, the Contractor acknowledges and agrees that it shall not file, claim or register any Liens and shall use its best efforts to prevent any Liens from being filed, claimed or registered by any Subcontractor or by any employee, or agent of the Contractor or Subcontractor, against the Services, Additional Services, the Plant as a whole or any part thereof, or any real or other property of the Purchaser, for any works done or any Services and/or Additional Services rendered under the Contract or any subcontract let by the Contractor and shall procure that all subcontracts contain undertakings to the like effect.

22.4.3 The Contractor shall indemnify the Purchaser against any loss, damage, cost or expense (including legal fees) of the Purchaser arising out of or in connection with any Lien being filed, claimed or registered as referred to Invoices and Payment.

22.4.4 The delay or failure of a party to pay any amounts due hereunder, or the withholding of any amounts which are claimed by a party to be due, shall not release the other Party from any of its obligations or liabilities under the

contract.

23 SCADA, EMS

Contractor shall be required from time to time to update the SCADA and EMS software, as required for the ongoing adequate operation of the Plant Facility. Such updates shall also be provided to the Purchaser at no additional costs.

24 INSURANCE

24.1 CONTRACTOR ‘S INSURANCE

The Contractor, at his own cost and expense, shall take out and maintain in full force and effect and shall cause its Subcontractors to take out and maintain in full force and effect, throughout the Term of the Contract and any extensions thereof, the following insurance policies from reputable insurers and shall provide the Purchaser with copies of the corresponding insurance certificates:

a) Covering physical loss or damage to the all-plant facilities at the Site, with an extended maintenance coverage for the Contractor’s liability in respect of any lossor damage for the entire term of the contract.
b) Workers compensation insurance, as required by the Applicable Law and Contracts made with employees.
c) Group Medical Claim, Group Term Policy & Group Personal Accident Insurances covering the financial consequences cause by damage and loss arising from sickness, disease, injury or death of any person employed by the Contractor in respect of the services performed Automobile Public Liability insurance, as required by the Applicable Laws, for all vehicles and automotive equipment ownedhired, rented, leased and non-owned by the Contractor and used in the performance of the Services.
d) Comprehensive General third-party liability insurance including product and contractual liability covering the financial consequences of the liability arising out loss or damage caused to third parties or to the Purchaser as consequence of the performance of the services.

e) All other insurance like – transit insurance (Marine/ Cargo/ others as applicable), Construction All Risk, Erection All Risk, workmen compensation, fire, third party liability, insurance against Insurance against theft, fire, act of God, Contractor's Equipment's, machinery breakdown policy, business interruption insurance, Property damage Insurance & Environmental risk insurance as required during the AMC period of the Plant shall be in the contractor's scope & shall borne by the Contractor.

The Service Provides shall ensure that under the aforementioned insurance policies, each of the insured has the ability to claim thereunder for a minimum period of three (3) months from the date of expiry of the insurance policies for any claims that arose prior to the expiry date.

The Purchaser shall be named as co-insured under all insurance policies taken out by the Contractor, except for the Third-Party Liability and Workers' Compensation Insurances, and the Contractor's Subcontractors shall be named as co-insureds under all insurance policies taken out by the Contractor, except for the Cargo, Workers' Compensation. All insurer's rights of subrogation against such co-insureds for losses or claims arising out of the performance ofthe Contract shall be waived under such policies.

Annual Status Report of Insurance Claims: The Contractor shall include the status of Insurance Claims made or required to be made during the year as part of the Annual Reporting Requirements.

24.2 **CONTRACTOR'S INSURANCE FOR THE PLANT FACILITY**

The Contractor shall take out and maintain an insurance policy, seamlessly with Contractors' all risks (CAR) policy taken earlier during construction phase, preferably from same insurance company for the plantfacility during the entire term of the contract

In the event of any incident or damage or loss that would be reasonably expected to result inan insurance claim, the Contractor shall:

a) Notify without delay to the Purchaser
b) Prepare and conduct all and any claims made under the policies effected by it, and all monies payable by any insurers shall be paid to the Contractor take all reasonable measures to mitigate the loss, its effects and to protect salvage.
c) Collaborate with Purchaser and the insurer and provide them with all information and documents they may request.
d) Arrange immediate reinstatement of the damage to the Purchaser's satisfaction, without waiting for the settlement for the corresponding insurance claim.
e) Claim in pursuant to the contract to the insurance agencies, if the claim is accepted or rejected or not accepted or partly accepted by the insurance agency then it will not limit the contractor obligation in any case and also if any losses on account of this shall be in the scope of contractor.

24.3 GENERAL INSURANCE REQUIREMENTS

24.3.1 The Contractor shall, provide copies of the corresponding insurance certificatesmentioned above.

24.3.2 If the Contractor fails to effect or maintain any insurance policy required hereunder, or fails to produce copy of the corresponding insurance certificates**,** the Purchaser may(but as no obligation), without prejudice to any other right or remedy available to it underthe contract, procure the insurance for the relevant coverage and/or pay the premiumsdue. Such payments shall be recoverable and deducted from the payments to be madeto the Contractor by the Purchaser under the Contract. In the event if Contractor does not pay the premium, then the Purchaser may pay the premium however in such case the obligations of Contractor to undertake the coverage shall continue as envisaged, irrespective of premium being paid by Purchaser. The Premium if paid by the Purchasershall be recovered from the Annual AMC Fees payable by the Purchaser to the Contractor.

24.3.3 The Contractor shall comply with the conditions stipulated in each of the insurance policies to be affected under the Contract and shall not make any alteration to the terms of any policy subscribed by it so it deviates from the requirements herein.

24.3.4 The Contractor must promptly notify to the Purchaser any notification received from an insurance company regarding any actual alteration to one of their policies.

24.3.5 On occurrence of any loss covered by an insurance policy contemplated under *Insurance*, the Contractor shall, as soon as reasonably possible, notify to insurance companies for the policy subscribed by it. The Contractor shall also take any appropriate measure to mitigate the effects to the loss to the maximum extent possible. The Contractor shall assist any assessment mandated by the insurance companies.

24.3.6 The required coverages referred to and set forth in this Article shall in no way affect or limit the Contractor's liability with respect to its obligations under the Contract.

25 The Contractor shall also arrange suitable insurance to cover following during the AMCPeriod:

a) **Machinery Breakdown**: Electrical & or machinery breakdown of any machinery or other equipment resulting in costly repairs or even replacement of the solar panel.

b) **Business Interruption**: Cover for period of operational downtime i.e., covering the cash flow of the solar business as a result of an insured peril, for example fire or storm damage, machinery breakdown or equipment failure.

c) **Property Damage**: The insurance should cover material damage due to external causes such as fire, theft, vandalism, sabotage, hail damage, snow load, lightning strike, overload, operational mistakes, clumsiness, negligence & theft.

d) **Purchasers Liability**: Provides cover against the risk of accident from usual workplace risks such as working at height & manual handling during

construction & AMC period.

e) **Environmental Risk Insurance**: Environmental damage coverage indemnifies solar system BBMB of the risk of either environmental damage done by their development or pre-existing damage on the development site.

ANNEXURE 1:

Scope of Work for AMC

i) The Contractor shall prepare the initial Annual Operating Plan for the Plant Facility and shall also indicate the proposed resources (manpower, material & machinery) that wouldbe deployed for AMC.

ii) The Contractor shall be responsible for the smooth day-to-day operation & maintenance of the Plant Facility.

iii) The Contractor shall provide necessary routine and preventive maintenance schedules of the plant for the Purchaser's approval and shall carry out all routine and preventive maintenance accordingly.

iv) The Contractor shall perform periodic overhauls and preventive maintenance required for the Plant in accordance with the recommendations of equipment manufacturers and as per the operation and maintenance manuals.

v) Contractor shall perform all break down maintenance and other maintenance in the Plant Facility. The Contractor shall be responsible for achieving the performance guarantee of the plant as indicated in the contract.

vi) The Contractor shall operate and maintain fire protection system and safety equipment for the plant.

vii) The Contractor shall do maintenance of electricity system including overhead lines in the Plant Facility area up to the Point of Common Coupling (PCC) to the grid at the site. Necessary co-ordination shall be made by the Contractor with BBMB and other agencies as may be required during the AMC term for smoot operation of the plant.

viii) Contractor shall work in coordination with the Purchaser or any Purchaser's

designated party to optimize the Plant production.

ix) The Contractor shall provide required spare plant Equipment, Spare Parts, tools and tackles, consumables required for comprehensive AMC of the plant facility. The Contractor shall make arrangement to procure required spare parts, or equipment/s as required, overhauling of parts, tools and equipment, required to operate and maintain the Plant in accordance with the recommendations of individual original equipment manufacturer at his own cost. Cost of imported Equipment & spare parts, if any, shall be included in the AMC quoted cost. The List of Consumables, Spare Parts, tools and equipment shall be finalised in consultation with the Purchaser or Purchaser's representative. List of recommended spare parts shall be submitted by the Contractor at the beginning of services, however, the complete recommended spares will be in the scope of contractor only. **In case any equipment or spares is not listed in the mandatory spares list but is required vitally for the operation of the plant, then the same shall be procured and provided by the contractor without any additional cost**.

x) It is the responsibility of the Service Provide to store the materials in appropriate stock so as to ensure timely availability of the materials.

xi) The Contractor shall employ only such personnel who are adequately qualified and experienced for maintaining such power generating sets.

xii) Contractor shall carry out all day-to-day operation and maintenance for the Plant Facility as set forth herein. Contractor shall perform the Work and supply all required spare parts in a prudent and efficient manner and in accordance with manufacturers and systems designers' specifications, the Annual Operating Plan for the Plant and all operation and maintenance manuals, all Indian applicable laws including environmental protection, pollution, sanitary, labour act, factory act, employment and safety laws, ("Government Rules") and Prudent Utility Practice. The contractor shall adhere to all labour laws which are applicable and as specified in the EPC contract document.

xiii) Contractor shall be responsible for:

- Maximizing plant capacity utilization,
- Reducing plant downtime,
- Optimizing the useful life of the equipment of the power plant.

xiv) The Contractor shall maintain all accounting records regarding the facility in accordance with the generally acceptable accounting principles under the Laws of India.

xv) The Contractor shall maintain accurate and up-to-date operating logs, records and monthly reports regarding operation and maintenance of the Plant facility (Such records shall be distinctly recorded for Solar PV Plant, in order to have clear data for assessment of any individual component of the Plant Facility) which shall include details of power output, other operating data, repairs performed and status of equipment. All such records to be maintained for a minimum of 60 (sixty) months after the creation of such record or data and for any additional length of time required by regulatory agencies with jurisdiction over the Parties. Upon expiry of term, the Contractor shall hand over all such records to PURCHASER. However, PURCHASER shall have access to all such records at any time. Generation and AMC reports should be made available to PURCHASER on daily and monthly basis in required formats as well as the Quarterly and Annual Performance Reports shall be provided. Contractor shall provide communications as well as daily, weekly, monthly, quarterly and annual reports to the Purchaser in the desired format as per the Contract with the Purchaser or Purchaser’s Engineer.

xvi) The Contractor shall develop and implement plans and procedures including those for firefighting, maintenance planning, procuring and inventory control of stores and spares, plan to meet emergencies, plant safety and security; and such other facilities and systems as may be necessary to commence Contractor's ongoing responsibilities.

xvii) The Contractor shall provide copies of all necessary documents including the following :

- Operation and maintenance manuals shall be prepared and approval shall be accorded from Purchaser within three months from the date of Operational acceptance.
- Failure Analysis/history/trouble shooting details of all the Equipment
- Identification of Equipment needing preventive maintenance
- List of Vendors indicating name and addresses during operation and maintenance with credentials
- root cause analysis report for any major failure.
- Record of consumables / spare parts

xviii) The Contractor shall be responsible for conveying following details to the Purchaser on daily basis as well as on monthly basis (by the end of 5th day of each month) giving the detail of plant performance during previous month.

- Power generated at all Solar PV Plant
- Power fed to the grid
- Internal power loss and internal consumption
- Power consumption for captive use (if any)
- Reactive power consumption
- Downtime of Plant Facilities including Solar PV Plant and other infrastructure of the Plant facility.

xix) The Contractor shall be responsible for liasioning with statutory authorities and local authorities in order to ensure smooth operation of the Power Plant.

xx) Contractor shall provide constant remote surveillance to the Plant Facility

xxi) Contractor shall provide updates and revisions to Reference Documents, as and when applicable.

xxii) Shall implement software updates to control and monitoring systems including EMS/SCADA in order to meet the plant facility operating requirement in consonance with the grid operations and in compliance with the grid codes as applicable during the operation.

xxiii) Duly and timely provide the Purchaser (or parties designated by the Purchaser) with all notifications required under the Contract including in particular such notifications set forth in Certain Notifications by Contractor;

xxiv) Contractor shall provide access to the Purchaser to all data for the Plant Facility from the EMS including the SCADA system.

xxv) Contractor shall at all times allow and provide Purchaser all necessary information for the operation of Energy Management System (EMS) including the SCADA system (with no notification or approval of access being required unless specifically and otherwise agreed to by the Parties) full, free, unconditional, safe and complete access to the EMS including the SCADA system. Contractor shall monitor and operate the Plant in accordance with the contract and shall ensure smooth operation of the plant.

xxvi) Provide the training to the Purchaser's personnel in relation to the operation of the complete plant facility.

xxvii) Contractor shall provide the insurances prescribed in insurance. The Contractor shall, with [prior intimation of 5 Business Days] at regular business hours, allow persons duly authorized by the Purchaser including but not limited to the officials of the insurance company of the Purchaser, to inspect the Project and provide to such personnel, access to all information which is necessary for their inspection, and is reasonably requested by the Purchaser. All representatives of the Purchaser shall strictly adhere to the Applicable Laws and the Health, Safety and Environmental (HSE) practices of the Contractor as provided in the Reference Documents;

xxviii) Contractor shall be responsible to comply with all applicable National and

International Standards as well as local statutory provisions related to Environmental Protection Regulations, Health and Safety requirement.

xxix) Contractor will be responsible for coordinating with the OEMs for securing warrantee conditions and services from OEMs as per the warrantee of each equipment, as well also for the Project insurance claims.

xxx) Contractor shall carry out the performance monitoring for the Plant Facility on continuous basis and in case of any deviation, the Contractor shall perform the due diligence appropriately to find out the actual root cause of such deviation. Any test or inspection required such as thermal imaging, IV characteristics test etc. to analyse such deviation will be the responsibility of the Contractor. Thereafter the corrective action required to mitigate such deviation shall be undertaken by the Contractor without any additional cost.

xxxi) Contractor shall be responsible for maintenance of all each and every civil infrastructures parts like cable trench, drain, plumbing system fire-fighting system, CCTV system, road, earthing, any foundations, anti-weeding, clearing bushes in the solar field etc., as per the direction of Purchaser's/Site- In-charge.

ANNEXURE 2

FUNCTIONAL GUARANTEES

1. ANNUAL CUF GUARANTEE

A. In consideration for the payment of the AMC Price , from the Commencement Date until the end of the Term, the Contractor grants to the Purchaser the CUF Guarantee on the terms and conditions set forth in the contract.

B. The Contractor guarantees the annual CUF committed herein over the AMC Period ("**Annual CUF Guarantee**") from the date of Operational Acceptance. In the event the CUF is less than the Guaranteed CUF, the Contractor shall immediately, upon demand, indemnify the Purchaser, as liquidated damages and not as penalty, amounts equivalent to remuneration of the equivalent Energy, subject to a maximum of hundred (100%) percent of the Total Annual AMC Price.

C. Capacity Utilization Factor (CUF) for Solar Plant shall be calculated as per the following formula.

$$CUF = \frac{Eac}{8760 \times Pac \times (1-DF \times (N-1)) \times RCF}$$

Where,

Eac is the number of units recorded in the plant end ABT meter excluding auxiliary consumption, kWh

8760 refers to the number of hours in non-leap year. It shall be replaced by 8784 hours during leap year

Pac is the plant AC capacity, kW

DF is module degradation factor, 0.7% per year

N is the number of years of operation after operational acceptance of the plant RCF is the Radiation Correction Factor:

$$RCF = \frac{\text{Measured Irradiation}}{\text{Reference Irradiation}}$$

Reference Irradiation for the site = Long Term Average Annual GHI (kWh/m^2) at the site as per Solar GIS database.

The Measured Irraditation (GHI_{mes}) shall be recorded from the Pyranometer installed in horizontal plane at the site location (average in case of multiple pyranometers). The radiation data of the Pyranometer shall be compared with the Reference Irradiation mentioned above. The radiation data from the Plant Pyranometer shall be used for computation of CUF, except in case of any discrepancy (i.e. more than ± 10% variation from the Reference Radiation, GHI_{ref}), in which case the radiation data from SolarGIS database for the said period will be used for computation of CUF. Missing data (GHI_{mes}) from the Plant Pyranometer shall be substituted by average of GHI measured for the sameperiod in the past three (3) days. The plant Pyranometer has to be under CCTV coverage.

Note:

i. CUF shall be calculated on annual basis from the date of operational acceptance of theplant till the end of AMC period.

ii. **Module degradation factor will not be considered for first year CUF calculation. It is the Contactor's responsibility to envisage and install extra DC capacity to accommodate any degradation during first year**. 0.7% per year will be considered from second year of operation.

iii. Grid outage hours shall be subtracted from total number of hours in a year. Grid outage shall be as per the certification from competent authority of

STU/CTU/BBMB.

D. LIQUIDATED DAMAGES FOR SHORTFALL IN ANNUAL CUF

As per Liquidated clause under SCC Section V

SECTION - VIII

SCHEDULE OF RATES (SOR)

1. **Bidders are required to quote for the Total Contract Price on Lumpsum basis in cognizance with the Tender Terms & Conditions.**

2. Bidder's quoted prices shall be strictly as per various Formats included under this Section [i.e. Section-VIII, Schedule of Rates (SOR)]. Bidder shall quote Lumpsum (LS) Price for the entire scope of work including Design, Engineering, Manufacture, Supply, Storage, Civil Work, Erection, Testing & Commissioning as per the Technical Specifications (TS) as defined under Section-VII.

3. All the Columns of quoted items in the Schedule of Rates including currency must be filled with required information, as applicable.

4. Bidder must quote the price in enclosed SOR formats only. The formats shall not be changed and/ or retyped.

5. Bidder to note that breakup of Lumpsum price is to be provided for assessment of Evaluated Bid Value (EBV), however total price payable under the Contract shall be restricted to the Lumpsum Price/ Contract Price only.

6. The Lumpsum Price shall be considered as Total Contract Price Which Purchaser agrees to pay and the Contractor agrees to accept as full compensation for the Contractor's full performance of the Work in accordance with the provisions of the Contract Documents. Contract Price shall not be subjected to any adjustment except in case of Change Order (an amendment in LOA issued by purchaser) or Statutory Variations in accordance with the provisions of the Contract.

7. The price quoted shall be Lumpsum price on Turnkey basis. Unless the basic parameter changes or additional/ extra requirements are made, total payments to be made to the contractor shall be limited to Lumpsum price indicated, irrespective of the progressive payments made during execution based on the split up of price.

8. Obligation of the Contractor is not limited to the quantities that the Contractor may either indicate in the Schedule of Breakup of Lumpsum Prices along with his bid or in further detailed break of Lumpsum prices furnished along with the bid or after award of work. Contractor shall carry entire scope of work/ supplies as detailed in various sections/ volumes of the Tender Document within the quoted Lumpsum Price (Contract Price).

9. Lumpsum Prices quoted by the Bidder shall include cost of any other supplies/ work(s) not specifically mentioned in the Bidding Document but necessary for the efficient, trouble free commissioning & operation of the Plant and to make this package job complete. Quoted price is FIRM and fixed till complete execution of the entire order. Also, variation on account of Foreign Exchange rate is not to be payable extra.

10. Spares for start-up/ commissioning and mandatory spares required are in Contractor's Scope and deemed included in the quoted Lumpsum Prices.

11. Bidder shall furnish following Forms of Schedule of Rates: -

    i. **Schedule of Rates (SOR - 1) i.e. Supply Part** : For providing the Ex Works supply, material including mandatory spares and any other supplies specified in the Tender Documents inclusive of packing & forwarding charges, Goods & services tax under the scope of Supply.

    ii. **Schedule of Rates (SOR - 2) i.e. Service Part:** For all services i.e., Storage, Handling at Site, freight and insurance, insurance at site, Civil Works, Design, engineering, Erection, Installation, Testing and Commissioning including Performance Testing in respect of all the Equipment’s supplied and/or erected under the scope of Supply and any other services specified in the Contract Documents.

    iii. **Schedule of Rates (SOR - 3) i.e. AMC Part:** For providing Comprehensive

annual maintenance of the Solar PV plant for Ten (10) Years {Five (5) years extendable for another Five (5) years} from the date of Operational Acceptance, as detailed in technical specification including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc.

iv. **Schedule of Rate (SOR-4) i.e. Quoted Capacity:** Quoted cumulative capacity minimum 11.5MW (AC) or higher as quoted by bidder.

v. **Schedule of Rate (SOR-5) i.e. Price per MW (AC):** Grand Total of Schedule of Rates SOR- 1 to 3 divided by cumulative capacity quoted by bidder but minimum 11.5MW (AC), to calculate per MW (AC) price.

SOR-5 i.e. Price per MW (AC) shall be used for e-RA.

The exact format for sharing the base price and all Goods & Service Tax is attached in "Schedule of Rates". Detailed Taxation Break up for this purpose is also given in the Schedule of Price for the Evaluated Bid Value (EBV) calculation purpose.

12. INR = Indian Rupees

13. Bidder confirms that he has noted the contents of the Preamble to the Schedule of Rates, Schedule of Rate, Bid Document and quoted his Prices accordingly without any deviation.