

**Clarification-1 for 10MW DRDO Solar PV Project @ Kolar**

S.no.	Section	Page No.	Clause No.	Tender Description	Queries	SECI Response
1	SCC	3 of 10	4	Location of Site Refer. Section-VII for the Project site layout)	As plant layout and SLD is not available in tender document kindly provide the same.	SLD of DRDO substation is uploaded along with Project boundary co-ordinates.
2	SOW & Technical Specifications	93 of 134	28.3.2	LIQUID RETAINING STRUCTURE	SECI/DRDO is requested to confirm where all this structure is required in the present scope of project.	The specifications are in order. A water tank of required capacity shall be provided as per Cl. No. 61.6 of Tech spec for storage of water for any source of water supply.
3	SOW & Technical Specifications	108 of 134	39.2.1	MMS FOUNDATION: In case the contractor proposes to provide concrete pile; the type, dia. and length of pile shall be as per recommendations of Geotechnical investigation report corresponding to prevalent soil characteristics at site. However the min. dia. and depth of the pile shall be 300mm and 1800mm respectively except when very hard strata/ rock (N>100) is encountered at a higher level, the pile shall be extended in to the hard strata minimum 1.0 times the diameter of the pile with total depth of the pile not less than 1200mm below cut-off level.	The minimum requirements of depth and dia shall be decided during detailed engineering after soil investigation. We request SECI/DRDO to amend this minimum requirement clause to optimize the design.	Tender condition Prevails
4	SOW & Technical Specifications	92 of 134	27.3	The ROW for the TL/UG cable shall be obtained prior to the construction of the line from the concerned authorities.	Usually bidder scope is restricted to plant boundary and responsibility of providing ROW rests with the owner. Hence please consider the scope of obtaining ROW in the scope of SECI/DRDO.	The grid substation (66/11kV) exists inside the DRDO campus, so there is no scope of ROW. Required design supply, erection testing and commissioning including civil works for construction of transmission line and 66kV bays are in contractor scope. The transmission line and bay construction shall be as per KPTCL/DISCOM standards. The SLD of DRDO substation is uploaded. All connectivity, open access, Wheeling, Banking and any other approval required for establishing and commissioning of bays and transmission line shall be in the scope of contractor. The distance between proposed plant and existing 66/11kV substation may be about 500m distance only.

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5	SOW & Technical Specifications	12 of 134	3.2.3	It should also have a reverse blocking diode at either of the incomer.	Reverse blocking diodes in SMU is not required as it would lead to additional continuous power loss. Each string shall dissipate power of about 7.0 W. About 1700 string shall exist for 10.0MW (AC) plant. Hence a total loss will be about 12.0 KW considering an average solar radiation of 5.2 Kwh / SqM , about 62 Units of energy will be lost every day. In view of the above SECI/DRDO is requested to please remove the clause.	Tender condition Prevails
6	SOW & Technical Specifications	13 of 134	4.1	Solar Cable from Module to SMU shall be as per TUV 2 PFG 1169/08.2007	TUV 2 PFG 1169/08.2007 has been withdrawn and EN50618 is the governing standard for solar cable. SECI/DRDO is requested to please modify accordingly.	Refer Amendment-1( s.no.7)
7	SOW & Technical Specifications	38 of 134	10.3.13	Earth leakage relay with Core balance CTs (CBCT) shall be provided on main incoming feeders having phase CT ratio more than 50/1A.	CBCTs are not generally preferred for a solidly grounded system. The requirement may please be removed as per the industry practice.	Tender condition Prevails
8	SOW & Technical Specifications	19 of 134	6.2	Voltage Ratio - 11 kV/ Inverter output voltage 11 kV/0.415 kV	Bidder may be allowed to choose intermediate voltage of 11 kV or 33 kV based on his techno-economic evaluation. Please accept	Tender condition Prevails
9	SOW & Technical Specifications	26 of 134	7.3.1	The switchgear panel shall be free standing, floor mounted, single front, single tier fully compartmentalized, metal enclosed construction.	Bidder may be allowed to choose MCVCB or outdoor PCVCB at inverter room and main control room level based on his techno-economic evaluation. Please accept.	Tender condition Prevails
10	SOW & Technical Specifications	34 of 134	8.5	Maximum voltage drop in LT cable (from inverter to inverter transformer) shall be limited to 0.5% of the rated voltage. For HT cables (from inverter transformer to interconnection point), maximum voltage drop shall be limited to 0.5 % of the rated voltage.	As per the industry standard, voltage drop on the AC side shall be less than at least 1%. Please consider.	Tender condition Prevails

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11	SOW & Technical Specifications	47 of 134	14.3.2	Each PV Module frame shall be earthed using copper wire of sufficient cross section.	PV module earthing shall be ensured by using serrated for installation on the module mounting structure and there by ensuring continuity to earth. Please accept and remove the requirement of separate copper earthing wire loop.	Tender condition Prevails
12	SOW & Technical Specifications	92 of 134	27.1	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 Owner	Please confirm the availability of the bay at the sub-station. Please provide the SLD of the 66 kV bay required at the Sub-station for integration in order to ascertain the exact scope of works.	Construction of additional bays to the existing 66/11kV DRDO's substation is in the scope of contractor. SLD of 66/11kv substation is uploaded
13	SOW & Technical Specifications	134 of 134	72.3	It is the responsibility of the Contractor to build-in the expected variation of irradiance in their design by installing additional DC capacity to meet the committed CUF. Irradiance variation will not be considered for the calculation of CUF.	As it's practically not possible to ascertain the prevailing radiation at the site please consider and include the effect of radiation in CUF validation.	Tender condition Prevails
14	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018		General	Radiation Data Base	In order to provide a level playing ground for all Bidders it is desirable that SECI/DRDO specifies the Radiation Data base to be referred, for eg (NASA / METENORM). This will ensure a uniform design criteria and also help SECI/DRDO to compare evaluate the Generation capacity committed by Bidders over a common platform.	Tender condition Prevails
15	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018		General	ACAD drawing of the site	Kindly furnish the Site Map to understand the actual area available for the PV plant installation along with ACAD.	The Project boundary coordinates are uploaded
16	Annexure C	1 of 2	General	The project land is divided in 2 patches by a road	All the necessary approvals and ROW clearances for the cable crossing between the plots shall be given by DRDO. Please confirm.	Approvals shall be provided by DRDO through SECI.If any damages to the existing structures shall be restored with the same condition within specified time frame by the contractor without any additional cost.

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17	Annexure C	1 of 2	General	The plot has a 66kV transmission line passing through the site. The plot also has an LT line running along the road.	Please confirm the exact scope of work of the bidder with respect to both these transmission lines.	The project shall be designed in a such a way, maximum land (without wasting the land space) to be utilized without disturbing the existing transmission line structures.
18	Annexure C	1 of 2	General	The disposal/handling/stacking of the same shall be carried out as per the instruction of the Owner.	DRDO/SECI is requested to obtain all necessary statutory clearances including forest clearance as it will be easy for DRDO to get the necessary statutory approvals for the same. This will ensure project to be completed as per the schedule. Handling/stacking will be done by the bidder but We request DRDO to handle the disposal.	All the statutory approvals are in the scope of contractor/bidder.
19	Annexure C	1 of 2	General	There are also around 60-70 neem trees scattered across the site, which need to be shifted as per land usage.	The mechanism for shifting of the tree is not easily available in India. Hence please consider to remove the trees by cutting. We propose the cutting of trees to be in scope of employer. Kindly Accept	The cutting of trees and stacking at one place as per the owner direction is in scope of Contractor.
20	SOW & Technical Specifications	92 of 134	General	Transmission line & 66 kV bay	Please allow the bidder to place the power transformer at the DRDO 66 kV Sub-station. This will facilitate to have transmission at 33 kV and a single 66 kV bay at the sub-station. Please confirm the availability of space for power transformer at the DRDO 66 kV Sub-station.	The choice of designing is in the scope of contractor. Space availability shall be assessed by the bidder. However, the standards shall be as per KPTCL/DISCOM standards.
21	SOW & Technical Specifications	114 of 134	40.23	Fasteners and washers to be used for erection of mounting structures and those for fixing Module over MMS shall be of stainless steel grade SS 304 & SS 316 with property class A2-50 and A2-70 respectively conforming to relevant ISO standard and must sustain the adverse climatic conditions to ensure the life of the structure for 25 years.	Please clarify if SS304 is to be used for MMS connections and SS316 for purlin to PV Module connection.	Please read the clause as follows: "Fasteners and washers to be used for erection of (connections in) mounting structure and those for fixing Module over MMS shall be of stainless steel grade SS 304 & SS 316 respectively with property class A2-70 conforming to relevant ISO standard and must sustain the adverse climatic conditions to ensure the life of the structure for 25 years"

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22	SOW & Technical Specifications	114 of 134	40.25	Modules shall be clamped & bolted with the structure properly. The material of clamps shall be Al / SS – 316 having weather resistant properties. Clamp – bolt shall use EPDM rubber and shall be designed in such a way so as not to cast any shadow on the active part of a module.	The PV-Modules are tested and certified with bolting arrangement only. Hence may permit only bolting of PV Modules without clamping arrangement.	Modules shall be bolted with the structure and clamping arrangement is not required.
23	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018	309/373	40.32	The length of one unit (Table) of MMS shall not generally be more than 20m.	We propose a 40-PV Module table with 2 tier potrait arrangement. With mandatory gaps between PV-Modules horizontally the total length of 1 unit of MMS Table shall be 20.5mts approx. May permit. The length of one unit may generally vary $\pm 5\%$ with respect to specified length due to dimensions of SPV Modules and Structure calculations. May please accept	The length of one unit (Table) of MMS shall not generally be more than 20m with $\pm 5\%$ is acceptable. Also bidder/Contractor shall propose any other length of (tables) of MMS as per their design assesment.The owner shall check the suitability and approval shall be provided.
24	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018		General		In case of divisible contract in respect of pure services and civil works contract, provisions of VAT on Works Contract shall not be applicable on pure services portion. Thus, deduction on account of WCT TDS shall be applicable on civil works contract only. However, in case, customer still deducts WCT TDS on their own on other than civil portion, the same shall be reimbursed to contractor within 7 days of such deduction. In case such deducted amount is deposited with tax authorities, the same shall be to employer's account.	VAT has now been replaced with GST, all the statutory deductions shall be done as per prevailing tax laws.

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25	GCC	64 of 77	92	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.	We propose to accept the bid excluding taxes and duties and GST shall be paid to the contractor as per actuals. Kiindly accept.	Tender condition Prevails
26	IFB	5 of 10	13.1	Comprehensive operation & maintenance of the Solar PV Power Plant for 10 (Ten) years	We propose to amend the period of O&M from 10 years 3 years as most of the recent tenders are having O&M for 3 years. Kindly Accept.	Tender condition Prevails
27	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018		General		We assume, if applicable, Anti Dumping Duty/ Safeguard duty/ CVD shall be in scope of employer. Kindly confirm.	All Taxes and duties are in the scope of contractor. Bidders are requested to Quote accordingly.
28	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018			land available for the project	Please specify the land (in acres) available for this solar power plant.	50 acres of land is available for the 10MW solar power plant
29	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018			Length of Transmission line	Kindly specify the length of transmission line from the solar power plant to the 66 KV substation.	The 66kV substation is about 500meters approx. from the proposed land available for the solar Project. The contractor shall access the route length for their estimation.
30	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018		General	Topographical survey/Soil Report	Please furnish the topographical survey, Soil report and contour map of the area to estimate the site levelling works and natural slope for drain works.	Estimation of site levelling works and natural slope for drain works etc. based on topographical survey, Soil report and contour map of the area is in the scope of the Bidder/ contractor as per the Tender conditions.
31	SCC	6 of 10		payment terms Interest bearing adjustable initial advance (OPTIONAL) of 10% of the Contract Value (i.e., total sum of all the Supply Contract & Service Contract) shall be released to successful bidder upon receipt of unconditional acceptance of NOA/ LOI/ LOA, detailed Performa invoice of contractor and against submission of unconditional & irrevocable Advance Bank Guarantee (ABG) with a validity period up to date of final commissioning total amounting to 110% of total advance amount. The ABG needs to be submitted in addition to the Contract Performance Security.	We request to give interest free mobilization advance. Kindly accept. We request to submit unconditional Bank Guarantee for 100% of advance amount. Kindly accept.	Tender condition Prevails.

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32	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018		EMD and Tender Fee		we kindly request you to exempt BHEL from submitting tender fee and EMD, BHEL being a CPSE.	Tender condition Prevails
33	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018		Performance Ratio	PR= 79%	We kindly request to revise the PR to 76%. Kindly Confirm.	Tender condition Prevails
34	ITB	32 of 48	40. PUBLIC PROCUREMENT POLICY FOR MICRO AND SMALL ENTERPRISES (MSEs)	-MSEs must be registered with any of the following agencies/ bodies shall be exempted from Tender Processing Fees and EMD submission upon production of valid registration certificate.	We are registered with Udyog Aadhaar as MSE. Kindly Confirm that, you will provide all benefits for MSE registered members as per law including price preference policy	Tender condition prevails, the price preference policy is not applicable.
35	GCC	51 of 77	73. Defects Liability Period	a)12 (Twelve) Months Period of Liability from the date of Operational Acceptance b) 73.4 The Defect Liability Period shall be of twelve (12) months from the date of completion of the Facilities	Since, There is discrepancy between these two clauses, please clarify DLP period...	The Defect Liability Period shall be of twelve (12) months from the date of Operational Acceptance shall prevail.
36	SCC	2 of 10	3	Time for Completion is: 06 (Six) Months from the date of issuance of NOA/ LOI/ LOA	Considering present delivery schedule of various components (including DCR category module) and contractor's Scope of work project completion period shall be 12 months from the date of issuance of NOA/ LOI/ LOA	Refer annexure-4 of Amendment -1
37	GCC	53 of 77	73.17	<b>warranty / guarantee period</b>	Warranty/Guarantee period for all equipment's shall be as per the OEM's recommendations.	Tender condition Prevails
38	GCC	23 of 77	20. Liquidated Damges	<b>LD for Delay</b> 1% of the Contract Price for the whole of the facilities, (or a part for which a separate time for completion is agreed) as liquidated damages , for each week or part thereof	We request you to amend this clause as follows:- LD at the rate of 0.5% per week on undelivered portion or part thereof and maximum up to 5% of total order value will be applicable on undelivered portion for the delay in contractual completion of project.	Tender condition Prevails

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39	SCC	5 of 10	6	Compensation for PR and CUF deviations as : Difference in units derived from committed and achieved CUF x (rate at which PPA will be signed with DRDO)	Kindly inform PPA rate or applicable penalty for CUF deviations	Applicable penalty shall be around Rs. 5.0/unit to Rs.6.0/unit x Difference in units derived from committed and achieved CUF. However, actual rate shall be communicated later.
40	SCC	6 of 10	10	<b>Payment Terms</b> a) Interest bearing adjustable initial advance (OPTIONAL) of 10% of the Contract Value (i.e., total sum of all the Supply Contract & Service Contract)	We understand that, Interest free advance which will be 10% of all contracts	Refer Annexure-5 of Amendment-1
41	SCC	3 of 10	6	<b>Contract Performance Security</b> a) First Stage-10% of the Contract Value (i.e., total sum of the Supply Contract & Service Contract) b) Second Stage-5% of the Contract Value (i.e., total sum of the Supply Contract & Service Contract)	We request you to amend this clause as follows:- a) First Stage-10% of the Contract Value (i.e., total sum of the Supply Contract & Service Contract excluding O&M part) valid till commissioning of plant. B) Second Stage-10% of the O&M contract Value initial validity of 1 year and renewing every year till the completion of O&M period.	Tender condition Prevails
42	SOW & Technical Specifications	92 of 134	27	Power evacuation system	Kindly confirm that, i) All charges for statutory approvals will be reimburse by you against documentary proof. ii)ROW for approach road and transmission line needs to be reimburse by you. We will negotiate with parties along with your representative. iii) Bay extension at DRDO substation is in bidder's scope or not. If yes, please provide exact scope of work to be done iv) Provide Transmission Line Route details v) All other facilitation will be in bidder's scope	i) All charges for statutory approvals are in the scope of contractor, same shall be included in the contract price. ii)Refer s.no.4 of this document iii) Bay extension at DRDO substation is in the scope of contractor. Detail scope shall be assessed by the contractor. iv) 66/11kV DRDO substation is located nearby the proposed land of solar project (about 500mtrs) route shall be assessed by contractor.



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43	Annexure C	1 of 2		SPECIFIC TECHNICAL SPECIFICATIONS	1. Necessary permissions and Clearance for vegetation (i.e. Bushes, small plants, tree cutting, shifting etc.) shall be arranged by owner 2. Shifting of existing lines passing through the sites and necessary permissions for the same if needed, shall be arranged by owner.	Necessary permission from DRDO shall be arranged by SECI for bushes removal, tree cutting and shifting. Any other approvals if required shall be in the scope of contractor
44	Technical Specs. GCC	8 of 134 30 of 77		<b>Modules</b> Mono-crystalline or Multi-crystalline Minimum 250 Wp with cells & modules manufactured in India	1. Minimum DC loading criteria applicable or not? 2. We understand this one is DCR category module. Kindly confirm	The Bidder shall assess the DC loading capacity in order to meet the minimum Functional Guarantees in terms of PR and CUF for the 10 MW Plant. 2. Project Products including Cells/Modules/Inverters from European, Japanese, American, Australian & Taiwan origin shall be allowed in this tender document. This clause will supersede all other existing clauses related to the Product origin/Source of supply clause elsewhere mentioned in the Tender Document.
45	IFB	7 of 10	Metering System- 1.7.	ABT meters (Main, Check and standby) with all necessary metering rated CT's and PT's at the plant take off point as well as at the substation as per CEA Metering Regulation 2006 as amended time to time and state metering code	Kindly confirm that, PG Test shall be carried out at power evacuation point at our plant end.	PG test shall be done based on the ABT Meter Reading at the substation end. Please refer the PG Test Procedure
46	GCC	65 of 77	94. Insurance.	During the entire Contract period including O&M period, i.e., during Construction & O&M period, all insurance related expenses shall be borne by the Contractor	As per norms & rules, During construction period all insurances shall be borne by bidder. During O&M period all insurances shall be borne by you/Owner as per the IRDA rule	Tender condition Prevails
47	GCC	13 of 77	2.4	Construction Power Supply	Power during construction period & O&M period shall be provided by Owner	Refer Amendment-1
48	GCC	13 of 77	2.3	Construction Water Supply	Water during construction period & O&M period shall be provided by Owner	Tender condition Prevails
49	SOW & Technical Specifications	34 of 134		All <b>cables</b> shall be Fire Retardant Low Smoke (FRLS) type	Kindly allow to use standard type cables	Tender condition Prevails

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50	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018	General		Make List	Kindly provide Approved Make list	No make list
51	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018	General		<b>Soil test report</b>	Kindly provide us soil test report	Tender condition Prevails
52	GCC	13 of 77	2.3	a) Power/Water from the Construction Site. B) Cost for Construction Power/Water during construction period	Kindly mention the distance of Tapping Point where we need to tap for water and Electricity for construction use. Kindly let us know the rate at which we will be charged for using Electricity and water.	For Construction Power refer amendment-1 For construction water-Tender condition prevails
53	SOW & Technical Specifications			Safe Bearing capacity (SBS) SBS of Project Site is required for installation of Module Mounting structure, Buildings, Transformer Foundation	Kindly Provide the initial SBC test report, so that we can calculate our costing based on the report, and once we are awarded the tender we will do the soil test on our own cost.	The Bidder/ shall assess the SBC on its own prior to bidding.
54	SOW & Technical Specifications			Inverter/PCU Inverter type & capacity is not available	Kindly provide inverter type & minimum capacity of inverter to use for project.	Inverter type shall be Central Inverter type with minimum 500 KW Capacity
55	SOW & Technical Specifications			PV Module 1) Whether the Module & cell will be DCR.manufactured in India or from foreign country. 2) RFID Tag or Bar Code shall be embedded inside the module?	1) Kindly confirm whether both module and cell should be made in India/only module/only cell/ we can use make in foreign country. 2) There are few reputed, approved manufacturers who are claiming they could not put the RFID tag inside the module instead they would be putting it outside, Kindly consider.	1) Project Products including Cells/Modules/Inverters from European, Japanese, American, Australian & Taiwan origin shall be allowed in this tender document. This clause will supersede all other existing clauses related to the Product origin/Source of supply clause elsewhere mentioned in the Tender Document. 2) Bar Code shall be embedded inside the module
56	SCC	2 of 10	Table No. 3.1	Completion period is 6 month	The major equipment like Inverter Duty Type Transformer, HT/LT Panel, inverter, atleast we need three & half months from the date of manufacturing Clearance (MFC) as it involves the testing, joint inspection also Our request to you extend the date of completion period by min. six months.	Refer Annexure-4 of Amendment -1

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57	SOW & Technical Specifications	92 of 134	Clause No.27	The contractor has to do the power evacuation and integration to and with designated substation via either overhead transmission line or underground cables as specified grid voltage with all necessary infrastructure such as protection switchgears and metering systems as per the requirement of the Owner.	1) Let us know whether we have to consider overhead transmission line or underground cables for power evacuation system.	The design scope belongs to contractor, either UG or OH is allowed. However all the evacuation system shall be as per KPTCL/DISCOM standards.
58	Annexure to BDS	4 of 5	1.4	For Consortium	Kindly mention Maximum no. of company allowed in a consortium can be make consortium with foreign company which have technical experience in foreign land/ outside own country.	Maximum of three bidders shall be allowed to form JV or consortium.
59	Annexure to BDS	5 of 5	1.4.8	1.4.8 In order to avail the benefits of exemptions in JV/Consortium, all the partners of JV/Consortium must be MSME Vendors/ developers registered under NSIC/Udyog Aadhar Category only.	Our request to you to allow any one of the consortium party to be MSME Vendors/Developers registered under NSIC/Udyog Aadhar Category only.	Tender condition Prevails
60		General		All kind of forestation, deforestation, land acquisition, statutory approval related to environment, forest, pollution etc., will not be under BTL's scope.	Kindly give us clarification.	Tender condition Prevails
61	Annexure to BDS	5 of 5	1.4.2	All the partners of the JV must meet collectively 100% Technical Eligibility Conditions-	We have 0% technical Qualification, but we would be financial supporter for the tender, then can we assume that lead partner meeting only the financial eligibility could participate in this tender by making consortium with technology providers who is having 100% technical Eligibility condition?	As per tender condition of 1.4.2 clause of "Annexure to BDS", it is found ok
62	IFB	3 of 10	3	SECI will be referred as Employer/owner	Kindly Clarify the scope of work of DRDO between Contractor and SECI	SECI is the Owner of the Project and the Project will be established in DRDO's land.
63	IFB	6 of 10	17	The owner shall conduct E reverse Auction if required	To bring more competitiveness we request the SECI to confirm at the pre-bid stage whether RA will be conducted or not.	Tender condition Prevails

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64	IFB	6 of 10	1.1	Adequate capacity of Solar PV Module	Kindly confirm if there is any specific AC/DC ratio	There is no specific requirement of AC/DC ratio. The Bidder shall assess the DC loading capacity in order to meet the minimum Functional Guarantees in terms of PR and CUF for the 10 MW Plant.
65	GCC	8 of 77	1.1.13	CUF	GHI is not under control of contractor , we request SECI to provide GHI Correction factor with respect to Reference GHI and Actual GHI, or provide GHI Reference value.	Tender condition Prevails The Bidder shall assess the accordingly in order to meet the minimum Functional Guarantees in terms of PR and CUF for the 10 MW Plant.
66	GCC	37 of 77	45	Site security during O&M Period	Since the site is under the premises of DRDO, Contractor may not have to depute any additional security	Even though the Project is inside the DRDO premises, the Project area of 10MW solar project will have separate boundary. Hence security personnel's are required as per contract condition.
67	GCC	30 of 77	32.1.4	Bay Extension	Please confirm if the connectivity letter is available with the SECI , further, please also confirm whether bay extension if bay extension is required.	Bay extension is required and it is in the scope of contractor. SECI has obtained feasibility approval from KPTCL. All further connectivity/open access/any other approval required for establishing and commissioning of bays and transmission line shall be in the scope of contractor.
68	SOW & Technical Specifications	8 of 134	2.3.1	The glass used to make the PV modules shall be toughened low iron glass with minimum thickness of 4.0 mm for 72 cell module and 3.2 mm for 60 cell module. The glass used shall have transmittance of above 90%.	The proposed modules are already complying with IEC standards as required in the tender. Incorporating the additional requirement of thickness of 4.0 mm for 72 cell will make the project cost higher, further, such requirement of thickness is a non standard requirements. Hence, We request WBREDA to accept thickness of 3.2 mm also for 72 as a standard practice followed by WBSEDCL, WBPDC, NTPC , Etc.	Tender condition Prevails
69	SOW & Technical Specifications	15 of 134	5.2	PCU- Maximum input Voltage-1000 V	We request SECI to Allow 1500 V System for cost optimization and better plant Quality.	1500 V system may be proposed. All relevant standards shall prevail where applicable. Accordingly suitable modification made, please refer Annexure 6 of Ammendment-1

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70	SOW & Technical Specifications			SMU	SMU may not be required as the industry will following the practice of monitoring as Inverter level, this will optimize the project value.	Tender condition Prevails
71	SOW & Technical Specifications	92 of 134	28.2	This excludes.....reference and record	We request SECI for clarify more on this exclusions for better understanding	The General specification specified in the tender may not be applicable for evacuation systems, But all the design,supply,installation and civil works including testing and commissioning pertaining to Transmission line, Bay extension works, metering arrangements and other KPTCL/DISCOM requirements shall be as per KPTCL/DISCOM approved standards.
72	SOW & Technical Specifications	99 of 134	32.3	The contractor.... Of relevant BIS Standard	We infer that the land is under the ownership of DRDO, hence, land should be provided after Cutting and felling of trees to the contractor for smooth execution of the project. Due to this clause drainage width has been increased by 1.5 times of normal.	Tender condition Prevails
73	SOW & Technical Specifications	100 of 134	32.3	Arranging land Lease	We infer that the land is under the ownership of DRDO and will be provided along with Notice to proceed.	SECI shall provide the land to contractor/Bidder for establishing 10MW Solar PV Project.
74	SOW & Technical Specifications	101 of 134	33.3	However, following minimum road section details shall be followed: Compacted subgrade: top 300mm thick, compacted up to 98% of standard proctor density	The subgrade thickness of 300 mm shall be of 98% Standard proctor density.	The specification is in order. As per IRC SP-20, top 300mm of cutting or embankment at formation level shall be treated as Sub-grade.
75	SOW & Technical Specifications	102 of 134	33.7	Except for module cleaning system the pipes for road culverts shall be of minimum class NP3 conforming....Water supply pipe for module leaning and service/ drinking water crossing the road shall be laid through Medium class GI steel pipe conforming to IS: 1161.	Pipe culvert specification is higher than normal pipe culvert which we provide. Concrete casing with dry stone pitching shall be added.	Tender condition Prevails

S.no.	Section	Page No.	Clause No.	Tender Description	Queries	SECI Response
76	SOW & Technical Specifications	103 of 134	34.7	The size of all internal and road side drains shall not be less than 450mm (bottom width) x 500mm (depth).	Drain shall be considered on both side of the internal road.?	Drain on single or both side of the internal road shall be as per the terrain characteristics and precipitation at site. The same shall be assessed by bidder prior to bidding. The road side drain shall be provided as per topography and drainage design to ensure smooth flow of surface run-off along the road and that water shall not flow over the road surface
77	SOW & Technical Specifications	103 of 134	34.9	In case of rectangular drain, the thickness of the wall shall be checked against structural stability. Min. thickness shall be 230mm for brick wall, 300mm for RR masonry and 125mm for RCC work, except for garland drain around buildings where the min. wall thickness can be 115mm, 200mm and 100mm respectively for brick masonry, RR masonry and RCC work.	If area is constraint for 2 m wide drain in our plot, we need to go for rectangular drain of this specified thickness.	Tender condition Prevails
78	SOW & Technical Specifications	107 of 134	37.7	The Seismic Load shall be considered corresponding to Earth quake zone at site as per IS: 1893 (Part- 4) with Importance factor 1.5.		Tender condition Prevails
79	SOW & Technical Specifications	110 of 134	39.3.5	All materials shall be hot dip galvanized conforming to relevant BIS standard with min.thickness of galvanization 80 microns.	At times it becomes impractical to maintain minimum thickness of galvanization of 80 Micron throughout the manufacturing process, hence we request SECI to allow Average thickness of galvanization of 80 Micron.	Tender condition Prevails (It is the minimum thickness requirement.)
80	Technical Specifications	7 of 13	5.1.14	5.1.14 Laying of underground / over ground Cables (all types, as applicable) with proper arrangements along with appropriate sized ferrules, lugs, glands and terminal blocks. Laying of cables inside the building trench and other locations as required shall be over GI cable trays with proper support and accessories.	Cable tray may not be required for UG cables.	Cable tray for buried cables is not required, however laying of cables inside the RCC trench/buildings as required shall be over GI cable trays with proper support and accessories. All the cable laying to be followed as per IS standards.
81	Annexure C	1 of 2		Project Land	Pls confirm total usable land area, further, Please confirm if the land is in ownership of DRDSO. We also request SECI to support by Providing Soil test Report.	Soil test report shall be in the scope of contractor

S.no.	Section	Page No.	Clause No.	Tender Description	Queries	SECI Response
82	Annexure C	1 of 2		Project Land	Pls confirm the type of road between two paths of Land , whether it is Public road, etc. . We also request SECI to support by providing Autocad layout of the demarcated land.	It is DRDO internal access road. The Project boundary coordinates is uploaded.
83	Annexure C	1 of 2		Draught Prone Area	As the project area is the draught prone area , approval for Borewell may not be allowed, We request SECI to allow Dry Cleaning of modules. DRDO/SECI may confirm the price of the tanker for proper estimation.	Dry cleaning is not envisaged as per Tender conditions. The bidder shall assess the price for procuring water for Module cleaning/Construction purposes prior to bidding. Additional bills/charges on this account shall not be entertained.
84	Annexure C	1 of 2		66 KV transmission line passing through the land	Please confirm of the this TL needs to be dismantled.	No, the existing TL is not to be dismantled.
85	Annexure C	1 of 2		60-70 neem trees to be shifted	We request SECI to Provide clear free title land after cutting/removing/Shifting of tree	Tender condition Prevails
86	IFB	5 of 10	15	Multiple package	We infer the bid is for single package of 10 MW, Kindly Confirm.	The proposed project is at single location only at Kolar.
87	IFB	10 of 10	5	First Contract (Supply and Services) & Second Contract (O&M)	To have a better tax implication and to lower the cost os the project , we request SECI to sign three (3) separate contracts - Supply contract, Erection, Testing & Commissioning Contract and O&M Contract.	Refer Ammendment-1
88	ITB	11 of 48	12.2	Price part should be filled online and uploaded	clarify	Tender condition Prevails
89	ITB	28 of 48	36.2	Contract period	Contract Period shall commence from the date of "Notification of Award"/ "Letter of Intent"/ "Letter of Allocation" or as mentioned in the Notification of Award/ Letter of Intent/ Letter of Allocation or hand over of clear free usable land whichever is later	Tender condition Prevails
90	GCC	23 of 77	20.1	LD for delay in completion 1 % for each week or part thereof	delete part there off	Refer Amendment -1
91	GCC	36 of 77	43.3.5	Indemnity Bond	Kindly provide the value of the stamp paper for indemnity bond	Rs.100/- stamp paper shall be used for indemnity Bond.

S.no.	Section	Page No.	Clause No.	Tender Description	Queries	SECI Response
92	GCC	37 of 77	45.3	Whenever a fault occurs.....LD will be levied on the deemed generation as per the tariff of Rs 5.50/unit	Practically Few major repairs may not be possible for getting repaired within stipulated 24 Hours, Further, the contractor is already liable for loss of penalty for under generation, hence, this clause leads to double implication of penalty, we request the employer to remove this double LD for same event.	Tender condition Prevails
93	GCC	38 of 77	45.4.4	Any Complaint...	Practically Few major repairs may not be possible for getting repaired within stipulated 24 Hours, Further, the contractor is already liable for loss of penalty for under generation, hence, this clause leads to double implication of penalty, we request the employer to remove this double LD for same event.	Tender condition Prevails
94	GCC	50 of 77	69.1	Action and compensation in case of bad works	This clause leads to interpretation of unauthentic penalty/compensation. The EIC should not be empowered with willingness to charge this compensation just by appearance of the work, hence, this may lead to contractual dispute, we request SECI to delete this clause.	Tender condition Prevails
95	GCC	50 of 77	70	Suspension of work	SECI has to pay mobilization and demobilization cost in case this clause is executed by SECI.	Tender condition Prevails



S.no.	Section	Page No.	Clause No.	Tender Description	Queries	SECI Response
96	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018	General			Since the Tender includes an EPC contract wherein majority of the equipment will be Bought-out equipment, any variance shall affect the Cost incurred by Contractor. Hence SECI is requested to consider admitting and paying / reimbursing any variance in taxes and Duties applicable on Bought-out systems and components directly dispatched to Employer's site. This is a prevalent practice adopted recently by all prominent Employers.	Please refer Amendment-1
97	SCC	3 of 10	6	CPBG 10 % And 5 %	As and industry Practice the CPBG for 5% should be on O&M Contract price and not on over all supply & Services.	Tender condition Prevails
98	SCC	3 of 10	8.2	LD for CUF	Please provide the PPA rate, also please confirm if this project is set up for captive use of DRDO.	This project is for consumption of DRDO and is being developed by SECI under Third Party Sale arrangement. LD shall be levied at the rate of Rs. 5.5/kWh x difference in units derived from committed and achieved CUF.
99	SCC	3 of 10	8.4	Penalty during O&M period against breakdown of other infrastructure of Solar Power Plant	Practically Few major repairs may not be possible for getting repaired within stipulated 24 Hours, Further, the contractor is already liable for loss of penalty for under generation, hence, this clause leads to double implication of penalty, we request the employer to remove this double LD for same event.	Tender condition Prevails
100	SCC	7 of 10	10	Payment Terms- last 10% after CUF demonstration and first year of O&M	As an industry practice we request SECI to release the last 10% payment of Supply contract and Civil Contract on submission of BG of Equivalent amount for till demonstration of CUF.	The provision exists in the Tender documents.
101	Technical Specifications	7 of 13	6	All approvals	Stating All approvals seems very vast , Contactor will only take CEIG approval, rest should be taken by SECI/DRDO, however, Contractor shall facilitate the approvals.	All approvals like connectivity, open access, wheeling and Banking and other approval required for the project will be in the scope of contractor. Tender condition Prevails

S.no.	Section	Page No.	Clause No.	Tender Description	Queries	SECI Response
102	Technical Specifications	7 of 13	6	payment towards statutory approvals	We infer that SECI/DRDO will reimburse expenses towards approvals at actual at extra.	The charges towards statutory approval is included in the contract price. This charges will not reimburse as extra.
103	Notice Inviting Tender For SECI/C&P/NIT/DRDO10MW/042018	General			Request not to link payment of last 10% of the amount to CUF demonstration; as already penalty for not meeting minimum CUF is in place.	Tender condition Prevails
104				The technical qualification criteria doesn't consider the job executed for own plant/ projects or job executed for Subsidiary/ Fellow Subsidiary/ Holding Companies. This stifles the competition for genuine bidders who have executed ground mounted grid connected projects for Subsidiary/ own projects either for Sale to Discom, Sale to NTPC/ SECI. It also restricts companies from bidding who have executed own projects under Group Captive or Third party Sale under Open Access.	Considering the spirit of the competition, we request you to kindly consider all the projects including the projects done for own plant and projects executed for Subsidiary/ Fellow Subsidiary for technical qualification. We request SECI/DRDO to at least consider those projects which were executed for a JV Subsidiary, where at least one of the JV partner was other than the bidder.	Tender condition Prevails
105				The qualification criteria is not clear when it says "Should have experience in development of Ground mounted Solar Projects on Turnkey basis including design, supply, installation & Commissioning..... "	Does the Supply defined in the Turnkey Development needs to include supply of all the equipment including Modules and/or Inverters? If the Modules and/or Inverters were free supplied by the developer and not procured by the bidder directly, can the bidder be still qualified to use the reference of such projects?	Yes,The bidder should have experience in development of Ground mounted Solar Projects on Turnkey basis including design, supply, installation & commissioning of at least 02 (Two) Grid connected Solar PV Power Plant Project having an individual capacity of 02 (Two) MW or above in last Seven Financial years and till last date of bid opening. However, such Solar PV Power Plant and Solar Systems capacity must have been in satisfactory operation for at least six (06) months from the date of commissioning. No,the Modules and/or Inverters which were free supplied by the developer and not procured by the bidder directly may not be considered for qualification requirement as per tender condition.

S.no.	Section	Page No.	Clause No.	Tender Description	Queries	SECI Response
106					Please refer Table number 3.1 and all relevant clauses related to completion period. Kindly note that the approvals are crucial for the project completion. Hence we request you to consider completion period as "6 months from the date of obtaining all project approvals".	Refer annexure-4 of Amendment -1
107					Please refer Sl. No 1.3 of page BDS 3 of 5. In this context, we request you to consider FY 17- 18 also for computation of average turnover. We will submit audited provisional balance sheet for the FY 17-18 certified by your statutory Auditor.	Refer Amendment-1
108	SOW & Technical Specifications	15 of 134	5.1	Overall efficiency of grid connected photovoltaic inverters	Request to consider the equivalent IEC 61683 for the same	Refer Annexure-2 of Ammendment-1
109	SOW & Technical Specifications	15 of 134	5.1	IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems	Request to consider equivalent IEC standard (IEC 61727) for the same	Refer Annexure-2 of Ammendment-1

### Amendment-1

S. No.	Section	Page No.	Clause	Original Clause	Amended Clause/New Clause
1	SOW & TS	7 of 134	2.1	Standards and Codes	Kindly refer Annexure-1 of Amendment-1
2	SOW & TS	8 of 134	2.2	Module Efficiency More than 18% for mono-crystalline More than 16% for multi-crystalline	Module Efficiency More than <b>18.5%</b> for mono-crystalline More than <b>17%</b> for multi-crystalline
3	SOW & TS	9 of 134	2.3.5	The module frame shall be made of anodized Aluminium, 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 micron.	The module frame shall be made of anodized Aluminium, 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 <b>frame thickness shall not be less than 40 mm and</b> anodization thickness shall not be less than 15 micron.
4	SOW & TS	9 of 134	2.3.6	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 IP67. Minimum three number of bypass diodes and two number of MC4 connectors with appropriate length of TUV 2Pfg 1169/08.2007 certified 4 sq.mm Cu 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.	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 IP67. Minimum three number of bypass diodes and two number of <b>IEC 62852/EN 50521 certified MC4 compatible</b> connectors with appropriate length of <b>IEC 62930/EN 50618</b> certified 4 sq.mm Cu 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.
5	SOW & TS	11 of 134	3.1	Standards and Codes IEC 61643-12: Surge Protection Device	Standards and Codes IEC 61643- <b>11</b> : Surge Protection Device
6	SOW & TS	12 of 134	3.2.5	Type-II surge protective device (SPD) conforming to IEC 61643-12 shall be connected between positive/negative bus and earth.	Type-II surge protective device (SPD) conforming to IEC 61643- <b>11</b> shall be connected between positive/negative bus and earth.
7	SOW & TS	13 of 134	4.1	Standards and Codes Solar Cable Applicable Standard TUV 2 Pfg 1169/08.2007	Standards and Codes Solar Cable Applicable Standard <b>IEC 62930/EN 50618</b>
8	SOW & TS	14 of 134	4.7.2 (i)	Solar cable type test certificate as per TUV 2 Pfg 1169/08.2007	Solar cable type test certificate as per <b>IEC 62930/EN 50618</b>
9	SOW & TS	14 of 134	4.8	Routine test and acceptance tests requirements shall be as per TUV specification 2Pfg 1169/ 08.2007 for solar cables and IS 7098-1 for DC cables.	Routine test and acceptance tests requirements shall be as per <b>IEC 62930/EN 50618</b> for solar cables and IS 7098-1 for DC cables.
10	SOW & TS	14 of 134	5.1	Standards and Codes	Kindly refer Annexure-2 of Amendment-1
11	SOW & TS	15 of 134	5.3.3	Type-II surge protective device (SPD) conforming to IEC 61643-12 shall be connected between positive/ negative bus and earth.	Type-II surge protective device (SPD) conforming to IEC 61643- <b>11</b> shall be connected between positive/ negative bus and earth.
12	SOW & TS	20 of 134	6.2	Bushing rating, Insulation class (Winding & bushing) HV side – 12 kV porcelain bushings LV side – 1.1 kV porcelain bushings	Bushing rating, Insulation class (Winding & bushing) HV side – 12 kV porcelain bushings LV side – 1.1 kV <b>epoxy</b> bushings
13	SOW & TS	21 of 134	6.3.7	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 class of +/-2 deg. For inverter transformers, WTI shall be provided for all the windings.	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 <b>1.5%</b> . For inverter transformers, WTI shall be provided for all the windings.
14	SOW & TS	26 of 134	7.3.8	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 5X.	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 <b>4X</b> .
15	SOW & TS	37 of 134	10.3.1	The panel shall be metal enclosed, free standing, floor mounted, modular type with compartmentalized construction having degree of protection of IP 54 as per IS 2147. All doors and covers shall be provided with neoprene gaskets to prevent entry of vermin and dust.	The panel shall be metal enclosed, free standing, floor mounted, modular type with compartmentalized construction having degree of protection of <b>IP 2X (Indoor)</b> as per <b>IS/IEC 60529</b> . All doors and covers shall be provided with neoprene gaskets to prevent entry of vermin and dust.

### Amendment-1

S. No.	Section	Page No.	Clause	Original Clause	Amended Clause/New Clause
16	SOW & TS	83 of 134	22.3.2	Control Room and equipment rooms 500 Office 300 Battery & other rooms 150 Other areas including periphery wall 10 Transformer yard 20 H – pole and metering point 10	Control Room and equipment rooms <b>300</b> Office 300 Battery & other rooms 150 <b>Internal/Peripheral Roads 4</b> Transformer yard/ <b>Switchyard 20</b> H – pole and metering point 10
17	SOW & TS	83 of 134	22.4.1	LED luminaires shall meet the following parameters:	Kindly refer Annexure-3 of Amendment-1
18	GCC	13 of 77	2.4.1	Contractor has to arrange for the construction power supply of their own. All the works will be done as per the applicable regulations with information to the Engineer-in-Charge/Project Manager. The temporary line will be removed forthwith after the completion of work or if there is any hindrance caused to the other works due to the alignment of these lines, the Contractor will re-route or remove the temporary lines at his own cost. The Contractor at his own cost will also provide suitable electric meters, fuses, switches, etc. No claim for compensation for any failure or short supply of electricity will be admissible	DRDO shall provide the three phase LT Distribution power for construction activity will be provided on chargeable basis as per State Electricity Board charges by the department through 32A capacity MCCB with three phase energy meter at a distance not exceeding 200 Mtrs from the building/construction area. The contractor has to make his own arrangements for drawing the construction power from this point unto work spot at his own cost. In case of any break down or insufficient supply of electricity, the contractor shall make his own arrangements of electricity power to augment supply commensurate the schedule of completion of work. Any additional power required for any other purpose including running any specialized equipment like Pile Drilling Machine, concrete boom lifts/Cranes, Fabrication of major steel works, Stone crushers, batching plant, hot mix plant, Paver etc., shall be arranged by the firm/contractor at their own cost. No claim of time extension and or money will be entertained by the department on this account. All the works will be done as per the applicable regulations with information to the Engineer-in-Charge/Project Manager. The temporary line will be removed forthwith after the completion of work or if there is any hindrance caused to the other works due to the alignment of these lines, the Contractor will re-route or remove the temporary lines at his own cost. The Contractor at his own cost will also provide suitable electric meters, fuses, switches, etc. No claim for compensation for any failure or short supply of electricity will be admissible
19	SCC	2 of 10	Defintions (Clause no.1)	Time for Completion is:  6 (Six) Months from the date of issuance of NOA/ LOI/ LOA as detailed below in Table No. 3.1.  Further Contractor is also to provide Operation & Maintenance Contract of Solar Photo Voltaic Plant for a period of 10 (Ten) years from the date of Operational Acceptance of the Plant.	Time for Commissioning is:  9 (Nine) Months from the date of issuance of NOA/ LOI/ LOA as detailed in Table No. 3.1. of Annexure-4 of Ammendment-1  Further Contractor is also to provide Operation & Maintenance Contract of Solar Photo Voltaic Plant for a period of 10 (Ten) years from the date of Operational Acceptance of the Plant.
20	GCC	9 of 77	1.1.27	COMPLETION CERTIFICATE shall mean the certificate to be issued when the works have been completed entirely in accordance with Contract Documents	COMPLETION CERTIFICATE/Taking over: shall mean the certificate to be issued after operational acceptance and completion of all facilities in accordance with Contract Documents
21	GCC	12 of 77	1.1.66	1.1.66 TAKING OVER means the Owner's written acceptance of the Facilities under the Contract, after successful Trial - Operation for the specified period in accordance with the Contract	Void

### Amendment-1

S. No.	Section	Page No.	Clause	Original Clause	Amended Clause/New Clause
22	GCC	23 of 77	20.1	Subject to Force Majeure Clause, if the Contractor fails to comply with the Time for Completion /successful commissioning of Plant in accordance with SCC Clause for the whole of the facilities, (or a part for which a separate time for completion is agreed) then the Contractor shall pay to the Owner a sum equivalent to one percent (1%) of the Contract Price for the whole of the facilities, (or a part for which a separate time for completion is agreed) as liquidated damages for such default and not as a penalty, without prejudice to the Owner's other remedies under the Contract, for each week or part thereof which shall elapse between the relevant Time for Completion and the date stated in Taking Over Certificate of the whole of the Works (or a part for which a separate time for completion is agreed) subject to the limit of ten percent (10%) of Contract Price for the whole of the facilities, (or a part for which a separate time for completion is agreed). The Owner 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, Owner may consider the termination of contract. Any such recovery on account of the Liquidated damages can be done from the running bills of the contractor by Owner.	Subject to Force Majeure Clause, if the Contractor fails to comply with the Time for Completion /successful commissioning of Plant in accordance with SCC Clause for the whole of the facilities, (or a part for which a separate time for completion is agreed) then the Contractor shall pay to the Owner a sum equivalent to one percent (1%) of the Contract Price for the whole of the facilities, (or a part for which a separate time for completion is agreed) as liquidated damages for such default and not as a penalty, without prejudice to the Owner's other remedies under the Contract, for each week or part thereof which shall elapse between the <b>Time for commissioning (as per SCC) and actual commissioning of plant</b> (or a part for which a separate time for completion is agreed) subject to the limit of ten percent (10%) of Contract Price for the whole of the facilities, (or a part for which a separate time for completion is agreed). The Owner 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, Owner may consider the termination of contract. Any such recovery on account of the Liquidated damages can be done from the running bills of the contractor by Owner.
23	SCC	10 of 10	New clause (Handing over-taking over)	(e) Immediately after taking over of complete facilities (s), the same will be handed over to the Contractor for Operation & Maintenance for a period of as mentioned in the bidding document.	(e) Immediately after <b>Operational acceptance certificate</b> , same will be handed over to the Contractor for Operation & Maintenance for a period of as mentioned in the bidding document.
24	SCC	9 of 10	Payment term	D. All the payment shall be released from Owner's Head Office, New Delhi, upon submission of Original Documents as mentioned against each Payment Milestones, Joint Commissioning and Handing Over Certificate duly certified by the authorized representative of Owner	D. All the payment shall be released from Owner's Head Office, New Delhi, upon submission of Original Documents as mentioned against each Payment Milestones, <b>along with completion certificate for first O&amp;M bill, Joint metering certificates and forecasting schedule</b> for the bill claim period duly certified by the authorized representative of Owner

### Amendment-1

S. No.	Section	Page No.	Clause	Original Clause	Amended Clause/New Clause
25	IFB	10 of 10	5	<p>(i) First Contract (Supply and Services): FOR destination basis Supply including Transportation for delivery at site and Insurance of all Equipment and materials including mandatory spares and any other supplies specified in the Contract Documents &amp; providing all services i.e., including Unloading, Storage, Handling at Site, Civil Works, Erection, Installation, Testing and Commissioning including Performance Testing in respect of all the Equipment supplied under the scope of Supply and any other services specified in the Contract Documents..</p> <p>(ii) Second Contract (O&amp;M): For providing Comprehensive operation &amp; maintenance of the Solar PV plant for 10 (Ten) years from the date of commissioning or Operational Acceptance, whichever is later, as detailed in technical specification including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc.</p>	<p>(i) First Contract (for Supply): FOR destination basis Supply of all Equipment and materials including mandatory spares and any other supplies specified in the Contract Documents.</p> <p>(ii) Second Contract (for Services) : For providing all services i.e. Transportation for delivery at site, Insurance, Unloading, Storage, Handling at Site, Civil Works, Erection, Installation, Testing and Commissioning including Performance Testing in respect of all the Equipment supplied under the "First Contract" and any other services specified in the Contract Documents.</p> <p>Both contracts will contain a cross fall breach clause specifying that breach of one will constitute breach of the other</p> <p>(iii) Third Contract (for O&amp;M): For providing Comprehensive operation &amp; maintenance of the Solar PV plant for 10 (Ten) 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.</p>
26	SCC	6 of 10	9	<p>Owner shall issue separate Orders (NOA/ LOI/ LOA) for different components of the contract i.e.,</p> <p>(i) First Contract (Supply and Services): FOR destination basis Supply including Transportation for delivery at site and Insurance of all Equipment and materials including mandatory spares and any other supplies specified in the Contract Documents &amp; providing all services i.e., including Unloading, Storage, Handling at Site, Civil Works, Erection, Installation, Testing and Commissioning including Performance Testing in respect of all the Equipment supplied under the scope of Supply and any other services specified in the Contract Documents..</p> <p>(ii) Second Contract (O&amp;M): For providing Comprehensive operation &amp; maintenance of the Solar PV plant for 10 (Ten) years from the date of commissioning or Operational Acceptance, whichever is later, as detailed in technical specification including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc.</p> <p>Both contracts will contain a cross fall breach clause specifying that breach of one will constitute breach of the other</p>	<p>Owner shall issue separate Orders (NOA/ LOI/ LOA) for different components of the contract i.e.,</p> <p>(i) First Contract (for Supply): FOR destination basis supply including supply all Equipment and materials, including mandatory spares and any other supplies , Transportation for delivery at site, transit insurance specified in the Contract Documents</p> <p>(ii) Second Contract (for Service): For providing all services i.e. , Insurance, Unloading, Storage, Handling at Site, Civil Works, Erection, Installation, Testing and Commissioning including Performance Testing in respect of all the Equipment supplied under the "First Contract" and any other services specified in the Contract Documents.</p> <p>Both contracts will contain a cross fall breach clause specifying that breach of one will constitute breach of the other</p> <p>(iii) Third Contract (for O&amp;M) : For providing Comprehensive operation &amp; maintenance of the Solar PV plant for 10 (Ten) 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.</p>
27	GCC	11 of 77	1.1.58	<p>1.1.58 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</p>	<p><b>1.1.58 PLANT/PROJECT/PLANT AND EQUIPMENT</b> 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</p>

**Amendment-1**

S. No.	Section	Page No.	Clause	Original Clause	Amended Clause/New Clause
28	GCC	61 of 77	82.1	<p>The payment against any Lumpsum item shall be made only on completion of that item as per the provision of the Contract after certification by Engineer-in-Charge/Project Manager</p>	<p><b>The payment for the First Contract (related to lumpsumSupply item Portion)</b> : shall be paid on Pro rata basis against supply with respect to Billing Break up approval and acceptance of Materials at site on submission of documents as per payment terms of SCC contract.</p> <p><b>For the Second Contract (related to lumpsum Services Part) - for both First Portion of the Services Part of (i.e. Site material handling, insurance, Erection, Testing and Commissioning Portion) and the second Portion of the Services Part of Second Contract (i.e. Civil &amp; Allied Works)-</b>shall be paid on pro-rata basis on completion of installation of equipment on certification by the Engineer-In-Charge/ Project Manager for the quantum of work completed after successful clearance of quality check points involved in the quantum of work billed as per the payment terms of the contract.</p> <p><b>Billing Break-up(BBU)-</b></p> <p>1) The Billing break up approval shall be prepared by the contractor and BBU shall be approved by the Engineer/Project incharge.</p> <p>2) For each item of SOR, BBU shall be prepared in the same SOR format (Item name, Uom, Quantity, unit FOR price, GST and Total price)and the sum of all billing break-up item prices shall be equivalent to the each SOR item price with discounted rate of e-Reverse auction(If applicable).</p> <p>The Contractor would be required to provide detailed BBU with Bill of Quantity (BOQ) along with the break-up of Contract Price (including taxes) and HSN code of the respective goods/services, at the time of signing of Contract Agreement which should match with the Price Quoted by the Contractor in its Price Bids and accepted by the Employer/Owner. This will be used by the Employer/Owner at the time of payment to the Contractor. Accordingly, bidders should diligently quote the taxes in the bid.</p> <p>Employer/Owner shall reimburse the amount of taxes as per the rates mentioned by Contractor in the detailed BBU/BOQ. In case of any statutory variation in GST during the currency of the Contract, same will be reimbursed to the Contractor subject to clause 13.4 &amp; 13.7 of the ITB, only in respect of the items/quantity which have been mentioned by the Contractor in the detailed BBU/BOQ.</p> <p>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 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.</p>



### Amendment-1

S. No.	Section	Page No.	Clause	Original Clause	Amended Clause/New Clause
29	SOW & TS	101 of 134	33.3 of 4)	4) Granular sub-base (CBR>15%): compacted 200 mm thick in two layers of 100mm thickness each,	4) Granular sub-base (CBR>15%): compacted 200 mm thick in two layers of 100mm thickness each, Grade-I
30	SOW & TS	132 of 134	69.3	An Indicative Field & Manufacturing Quality Plan for civil, structural and MMS works is enclosed with this specification for reference as Annexure-No.	An Indicative Field & Manufacturing Quality Plan for civil, structural and MMS works is enclosed with this specification for reference as Annexure-A
31	GCC	64 of 77	93.4	New clause	<p>In case of imported Equipment/items purchased from third party (Bought-Out Items) are supplied to the Employer/Owner 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 &amp; 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 duration (original contract period), same will be reimbursed to the Contractor only in respect of the taxes which are levied during the direct transaction held between Employer/Owner and the Contractor. Any statutory variation applicable in respect of the items/services procurement between third party/sub-contractor and the Contractor would not be reimbursed by SECI.</p> <p>In nutshell, in case of Bought out Items supplied in the Project execution, there would be two transactions viz. one between "Third Party/Subcontractor/Supplier" and the "Contractor" and second between "Contractor and Owner/Employer". In such case, statutory variation in taxes levied/to be levied between the former transactions would not be reimbursed, however, same would be reimbursed for the later transaction.</p>

### Amendment-1

S. No.	Section	Page No.	Clause	Original Clause	Amended Clause/New Clause
32	Annexure to BDS	3 of 5	1.3	<p>The Minimum Average Annual Turnover (MAAT) of the bidder in the last three financial years (i.e. FY 2014-2015, 2015-2016 and 2016-17) should be INR 23, 80, 50, 000/- (Indian Rupees Twenty Three Crores Eighty Lacs and fifty Thousand only). MAAT shall mean Revenue from Operations as incorporated in the profit &amp; loss account excluding other income, e.g. sale of fixed assets. This must be the individual Company's turnover and not that of any group of Companies. A summarized sheet of average turn over certified by a practicing CA/Statutory Auditor should be compulsorily enclosed along with corresponding annual accounts.</p> <p>AND</p> <p>"Net Worth" of the Bidder shall be calculated as per Company Act 2013. The net worth for the last financial year should be positive.</p> <p style="text-align: center;">AND</p> <p>The bidder should have a minimum Working Capital of INR 11, 90, 25,000/- (Indian Rupees Eleven Crores Ninety Lacs and Twenty Five Thousand only) as per the last audited financial statement. If the bidder's working capital is inadequate, the bidder should supplement this with a letter from the bidder's bank, having net worth not less than INR 500 Crores, confirming the availability of the line of credit for equal to or more than INR 11, 90, 25,000/- (Indian Rupees Eleven Crores Ninety Lacs and Twenty Five Thousand only) to meet the working Capital requirement of this particular Project.</p>	<p>The Minimum Average Annual Turnover (MAAT) of the bidder in the last three financial years (i.e. <b>FY 2015-2016, 2016-2017 and 2017-18</b>) should be INR 23, 80, 50, 000/- (Indian Rupees Twenty Three Crores Eighty Lacs and fifty Thousand only).</p> <p>In case audited annual accounts for FY 2017-18 are not available, then MAAT of the bidder shall be computed for preceding 3 Financial Years (FY2014-15, 2015-16 and 2016-17). MAAT shall mean Revenue from Operations as incorporated in the profit &amp; loss account excluding other income, e.g. sale of fixed assets. This must be the individual Company's turnover and not that of any group of Companies. A summarized sheet of average turn over certified by a practicing CA/Statutory Auditor should be compulsorily enclosed along with corresponding annual accounts.</p> <p>AND</p> <p>"Net Worth" of the Bidder shall be calculated as per Company Act 2013. The net worth for the last financial year should be positive.</p> <p style="text-align: center;">AND</p> <p>The bidder should have a minimum Working Capital of INR 11, 90, 25,000/- (Indian Rupees Eleven Crores Ninety Lacs and Twenty Five Thousand only) as per the last audited financial statement. If the bidder's working capital is inadequate, the bidder should supplement this with a letter from the bidder's bank, having net worth not less than INR 500 Crores, confirming the availability of the line of credit for equal to or more than INR 11, 90, 25,000/- (Indian Rupees Eleven Crores Ninety Lacs and Twenty Five Thousand only) to meet the working Capital requirement of this particular Project.</p>

## **Annexures of Amendment-1**

For Tender No. SECI/C&P/NIT/DRDO10MW/042018-10MW DRDO Solar PV Project @  
Kolar

### **Annexure-1**

#### 2.1 Standards and Codes

**Photovoltaic Modules shall comply with the specified edition of the following standards and codes.**

<b>Standard</b>	<b>Description</b>
IEC 61215-1 Ed. 1.0	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements
IEC 61215-1-1 Ed. 1.0	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules
IEC 61730-1 Ed. 2.0	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction
IEC 61730-2 Ed.2	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing
IEC 61701 Ed.2	Salt mist corrosion testing of photovoltaic (PV) modules (Applicable for coastal and marine environment)
IEC 62716 Ed.1	Photovoltaic (PV) modules - Ammonia corrosion testing
IEC TS 62804-1 Ed.1	Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation - Part 1: Crystalline silicon

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.

## **Annexure-2**

### **5.1 Standards and Codes**

**Power Conditioning Unit (PCU) shall comply with the specified edition of the following standards and codes.**

<b>Standard</b>	<b>Description</b>
IEC 61683 Ed. 1	Photovoltaic systems - Power conditioners - Procedure for measuring efficiency
IEC 62109-1 Ed. 1	Safety of power converters for use in photovoltaic power systems - Part 1: General requirements
IEC 62109-2 Ed. 1	Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters
IEC 61000-6-2 Ed. 2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments
IEC 61000-6-4 Ed. 2.1	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
IEC 62116 Ed. 2	Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures
IEC 61727:2004 Ed. 2	Photovoltaic (PV) systems - Characteristics of the utility interface
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: Dry heat
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 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.

### **Annexure-3**

22.4.1 LED luminaires shall meet the following parameters:

<b>Parameter</b>	<b>Specified Value</b>
Input voltage	170-260 V
Input Frequency	50 Hz +/-1 Hz
Power Factor	0.90 (Minimum)
Luminous efficacy	>90 lumens per watt
Beam Angle	Minimum 120°
Total Harmonic Distortion	< 10 %
Working Humidity	10% - 90% RH (Preferably Hermetically sealed unit)
Degree of Protection	Minimum IP 65 (for Outdoor fixtures)
Luminaire Casing	Powder coated metal / Aluminium.
Color Temperature	5700 K (cool day light)
Color Rendering Index	>65
Moisture protection in case of casing damage	IP 65 (driver unit shall preferably be totally encapsulated)

**Annexure-4**

**Table No. 3.1**

<b>S. No.</b>	<b>Stage</b>	<b>Reference from D</b>
3.1.1	Issue of NOA/ LOI/ LOA	Zero Date (D)
3.1.2	Detailed Engineering Design and Drawing Approvals & Procurement Planning and Approval	<b><u>D + 9 Months</u></b>
3.1.3	Completion of supply of major equipment like SPV Modules (including structure for the above), Power Conditioning Units, transformers etc.	
3.1.4	Installation of all Major Equipment	
3.1.5	Interconnection of all Major Equipments and Completion of Installation	
3.1.6	Testing and Pre-Commissioning of Solar PV Power Plant	
3.1.7	Commissioning of Plant	

**Annexure-5**

**Payment Terms**

10.	New Clause (Payment Terms)	<p>A. The payment for the First Contract (related to lump sum Supply item Portion) shall be made as per the following terms and conditions:</p> <p>i) Interest bearing adjustable initial advance (OPTIONAL) of 10% of the Contract Value (i.e., total sum of all the Supply Contract) shall be released to successful bidder upon receipt of unconditional acceptance of NOA, detailed Performa invoice of contractor and against submission of unconditional &amp; irrevocable Advance Bank Guarantee (ABG) with a validity period up to date of final commissioning total amounting to 110% of total advance amount. The ABG needs to be submitted in addition to the Contract Performance Security. The annual interest rate shall be calculated based on SBI one year MCLR as applicable.</p> <p>ii) Seventy percent (70%) payments shall be paid on Pro rata basis against supply, receipt and acceptance of Materials at site on submission of documents (except Advance Bank Guarantee) indicated under clause i) above, Contractor's detailed invoice &amp; 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 Executing Agency's authorized representative in original.</p> <p>(a) If Successful Bidder has opted for advance then, Ten percent (10%) (full amount of advance) shall be adjusted while making</p>
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payments of this installment. Also, up-to-date accrued interest shall also be recovered.

(iii) Twenty percent (20%) payments shall be paid against successful erection, testing and commissioning of materials at site and Operational Acceptance of the Facility pursuant to successful Guarantee Tests and demonstration of Performance Ratio (PR) including submission of all as-built drawings and documents.

(iv) Final Ten percent (10%) payment of Supplies shall be paid after CUF demonstration on completion of first year of O&M of the Facility pursuant to submission of all requisite documentation. However, this Payment may also be released after demonstration of PR and submission of all requisite documentation on the submission of additional Bank Guarantee of equivalent amount. The BG shall be valid up to demonstration of CUF for the successful first year of Operation. However, in case of delay, the BG shall be extended suitably.

**B.** Now, For the Second Contract (related to Services Part), the payment shall be made as detailed below. No Initial Advance Payment shall be made against Second Contract related to Service Part.

It may be noted that the amount towards EPF and ESIC is not over and above the Contract Value. Contract Value is assumed to be inclusive of all such amounts (PF and ESI contribution of the Executing Agency). Thus, in order to ensure the compliance with these requirements, Owner will release the payment to the Contractor in accordance with the following mechanism:-

Amount towards PF and ESI Contribution will be presumed to be included in Service Part of the Contract. Accordingly, respective progressive/stage payments under Service Contract will be



released to the Contractor after ensuring/obtaining copies of following documents from the contractor:-

1. Copies of EPF/ESIC Challan
2. Wage Sheet duly certified by the Engineer in Charge/Project Manager/Authorized Signatory of the Owner
3. Attendance Sheet of the manpower deployed by the Contractor on the Project which will be duly counter certified by Engineer in Charge/Project Manager/Authorized Representative of Owner.

In case the Contractor could not produce the required documents at the time of its claim for any progressive/stage payment under Service Contract, Owner shall be at liberty to deduct the amount equivalent to the PF/ESIC (for the period for which manpower has been deployed on the project) from that stage payment which will be released to the Contractor later on only on production of required documents.

**Further, such kind of adjustments may be made by Owner from either First Portion or the Second Portion of the Service Part of second Contract.**

ii) For the First Portion of the Services Part of Second Contract (i.e. Site Material Handling, Erection, Testing and Commissioning Portion), the payment shall be made as detailed below: -

(a) Eighty Percent (80%) of the total price of Design, Engineering, Erection, Testing and Commissioning shall be paid on pro-rata basis on completion of installation of equipment on certification by the Engineer-In-Charge/ Project Manager for the quantum of work completed after successful clearance of quality check points involved in the quantum of work billed.

(b) Ten Percent (10%) of the total price of Design, Engineering, Erection, Testing and Commissioning shall be paid on Operational Acceptance of the Facility pursuant to successful integration with

	<p>existing internal grid system, Guarantee Tests and demonstration of PR.</p> <p>(c) Final Ten percent (10%) payments shall be paid after CUF demonstration after first year of O&amp;M of the Facility pursuant to submission of all requisite documentation. However, this Payment may also be released after successful Guarantee Tests and demonstration of PR and submission of all requisite documentation on the submission of additional Bank Guarantee of equivalent amount. The BG shall be valid up to demonstration of CUF for the successful first year of Operation. However, in case of delay, the BG shall be extended suitably.</p> <p>iii) For the second Portion of the Services Part of Second Contract (i.e. Civil &amp; Allied Works), the payment shall be made as detailed below:</p> <p>(a) Eighty Percent (80%) of the total price of Civil Works shall be paid progressively on certification by the Project Manager/ Engineer In - Charge for the quantum of work completed/ Milestones achieved after successful clearance of quality check points involved in the quantum of work.</p> <p>(b) Ten Percent (10%) of the total price of Civil Works shall be paid on completion of all the civil works including finishing and debris removal.</p> <p>(c) Final Ten (10%) of the total price of Civil Works shall be paid after CUF demonstration after first year of O&amp;M of the Facility pursuant to completion of all the civil works including finishing and debris removal. However, this Payment may also be released after completion of all the civil works including finishing and debris removal on submission of Bank Guarantee of equivalent amount. The BG shall be valid up to demonstration of CUF for the</p>
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successful first year of Operation. However, in case of delay, the BG shall be extended suitably.

**C.** For the Third Contract (related to Operation & Maintenance Part), the payment shall be made as detailed below: -

(a) Against successful Operation and Maintenance of the Facility on quarterly basis at the end of every quarter for each year till 10 (Ten) years. The O&M of the plant will commence from the date of Operational Acceptance Date of the facility.

(i) Year 1 : OM -1

(ii) Year 2 : OM -2

(iii) Year 3 : OM -3

(iv) Year 4 : OM -4

(v) Year 5 : OM -5

(vi) Year 6 : OM -6

(vii) Year 7 : OM -7

(viii) Year 8 : OM -8

(ix) Year 9 : OM -9

(x) Year 10 : OM -10

**D.** All the payment shall be released from Owner's Head Office, New Delhi, upon submission of Original Documents as mentioned against each Payment Milestones, along with completion certificate for first O&M bill, Joint metering certificates and forecasting schedule for the bill claim period duly certified by the authorized representative of Owner

## **Annexure-6**

Modifications in the following clauses have been made, for suitability of 1500V D.C system,

2.3.2 The back sheet used in the PV modules shall be of three layered or mono layered structure. The back sheet should be durable for humid – hot conditions with properties of moisture barrier, elongation retention and UV resistance. The back sheet shall have the following properties.

<b>Parameter</b>	<b>Value</b>
Material thickness	≥ 300 micron
Water vapour transmission rate	< 2 g/m <sup>2</sup> /day
Partial discharge test voltage	≥ 1000 V/ <b>1500V</b>
Elongation at break	> 100%
Adhesion strength with encapsulant	> 70 N/cm
Interlayer adhesion strength	> 5 N/cm

The Owner 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.

2.3.6 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 IP67. 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 Cu 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.

### **String Monitoring unit**

#### **3.1 Standards and Codes**

<b>Standard/Code</b>	<b>Description</b>
IEC 60529	Enclosure Ingress Protection
IEC 62262	Enclosure Impact Protection
<b>IEC 60269</b>	Fuse
IEC 61643-12	Surge Protection Device
IEC 62852 or EN 50521	Solar cable connector
<b>IEC 60695-2-11</b>	<b>Fire hazard testing</b>

**3.2.1** Enclosure shall be made of UV resistant, fire retardant, thermoplastic material. Enclosure degree of protection shall be at least IP65 and mechanical impact resistance shall be at least **IK08**

**3.2.5** Type-II surge protective device (SPD) conforming to IEC 61643-11 shall be connected between positive/negative bus and earth.

**3.2.7** MC4 connector conforming to IEC 62852 or EN 50521 shall be provided at each SMU input. Cable gland (double compression metallic) of suitable size for DC cables shall be provided at the SMU output.

## Solar and DC Cables

### 4.1 Standards and Codes

Cable	From	To	Conductor/ Insulation	Voltage Rating	Applicable Standard
Solar Cable*	Module	SMU	Copper/ XLPO	1.1 kV DC/ <b>1.5kV DC</b>	<b>IEC 62930/ EN 50618</b>
DC Cable	SMU	Power Conditioning Unit	Copper or Aluminium/ XLPE	1.1 kV DC/ <b>1.5kV DC</b>	IS 7098 Part I
* Cable used for module interconnection shall also be referred as solar cable.					

### 4.7.2 Test Certificates/Reports

- (i) Solar cable type test certificate as per **IEC 62930/ EN 50618**.
- (ii) DC cable type test certificate as per IS 7098-1

### 4.8 Tests

Routine test and acceptance tests requirements shall be as per **IEC 62930/EN 50618** for solar cables and IS 7098-1 for DC cables.

## Power Conditioning Unit

### 5.2 Technical Requirements

Parameter	Specification
Rated AC power	As per design
Maximum input voltage	1000 V/ <b>1500V</b>
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	IP 20 (Indoor)/IP 54 (Outdoor)

5.3.3 Type-II surge protective device (SPD) conforming to **IEC 61643-11** shall be connected between positive/negative bus and earth.