

TENDER NO:



**SUPPLY OF SOLAR PV MODULES FOR 500 MW (AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET i of ii



SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

SECTION - 8: SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

ISSUE
R0

TENDER NO:



**SUPPLY OF SOLAR PV MODULES FOR 500 MW (AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET ii of ii



SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

1.0.	PROJECT INFORMATION	1
2.0.	SCOPE OF WORK	2
2.1.	SCOPE OF SUPPLY	2
2.2.	REQUIREMENTS FROM BIDDER	4
2.3.	INSURANCE	4
2.4.	EXCLUSIONS FROM THE SCOPE OF WORK	4
3.0.	MODULE WATTAGE DISTRIBUTION AND DEFECTIVE MODULE	4
3.1.	MODULE WATTAGE DISTRIBUTION	4
3.2.	DEFECTIVE MODULE	5
4.0.	PROVENESS CRITERIA FOR SOLAR PV MODULES	6
5.0.	TECHNICAL PARTICULARS OF SOLAR PV MODULE	6
5.1.	DATA SHEET	6
5.2.	STANDARD TESTING CONDITION AND QUALITY REQUIREMENTS	9
5.3.	QUALITY ASSURANCE PLAN	10
5.4.	MATERIALS INSPECTION PLAN – MANUFACTURING STAGE AND / OR PRE-DISPATCH INSPECTION	11
5.5.	LABELLING AND NAME PLATE REQUIREMENT	12
5.6.	INSURANCE REQUIREMENT	13
5.7.	INSTALLATION REQUIREMENTS	13
5.8.	RFID REQUIREMENTS	14
5.9.	GUARANTEE AND WARRANTY	15
6.0.	DATA TO BE FURNISHED ALONG WITH THE BID	15



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 1 of 16



SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

1.0. PROJECT INFORMATION

- 1) Owner : Gujarat Industries Power Company Limited
- 2) Consultant : TATA Consulting Engineers Limited
71 Cunningham Road, Bangalore – 560052
- 3) Project title : 500 MW (AC) Solar PV Plant at Khavda, Gujarat
- 4) Location : Khavda, Tal. Bhuj, Dist. Kutch, Gujarat.

Site coordinates (UTM):

Sr. No.	Zone	Longitude (E)	Latitude (N)
1	42R	559191.546	2667617.877
2	42R	562280.699	2668006.890
3	42R	563323.014	2666751.188
4	42R	563982.479	2665452.200
5	42R	562092.89	2665443.52
6	42R	559191.546	2665555.445

- 5) District : Kutch
- 6) Nearest town : Bhuj (90 km)
- 7) Nearest railway station : Bhuj (90 km)
- 8) Nearest airport : Shyamji Krishna Verma airport, Bhuj – 125 km
Kandla airport – 190 km
- 9) Access road : Gujarat SH-45 (1 km)
- 10) Wind data (as per IS: 875, part 3)
- a) Basic wind speed : 47 m/s



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 2 of 16



SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

- 11) Seismic data : As per IS: 1893 (latest revision)
- a) Zone : 5
- 12) Languages spoken in the region: : Gujarati, Hindi
- 13) Official language for the bidder to deal with : English
- 14) Installation of modules : Ground mounted (SAT)

2.0. SCOPE OF WORK

The detailed scope of work in accordance with this specification is elaborated below. The scope of the bidder shall be deemed to include all such items, which although are not specifically mentioned in the bidding documents and/ or in bidder's proposal but are needed to make the system complete in all respects for its safe, reliable, efficient and trouble-free operation and the same shall be furnished unless otherwise specifically excluded as per section terminal points and exclusions.

2.1. SCOPE OF SUPPLY

- a) The scope of supply includes manufacturing, testing, packing and forwarding, handling (upto receipt at site) insurance, and transportation of solar PV modules (bifacial technology) up to Project site at 2375 MW RE Park Nr. Vill. Khavda, Great Rann of Kutch, Gujarat on single point responsibility. (Unloading will be done by BoS Vendor).
- b) The total capacity of PV modules to be procured under this contract, excluding mandatory spares is 625 MWp. The bidder shall supply 0.5% of the awarded PV module capacity as mandatory spares in addition to the awarded PV module capacity.

Solar PV module: ALMM category (minimum 540 Wp and maximum 570 Wp nominal rating within the dimensions specified elsewhere in this tender) for 1500 V system voltage under the following capacity:

Main supply (DC capacity)	Mandatory spares (0.5% of main supply) (DC capacity)	Total supply (DC capacity)
625 MWp	3.125 MWp	628.125 MWp

ISSUE
R0



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 3 of 16



SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

- c) This specification lays down the requirements and tests of solar PV module for ground mount applications.
- d) PV modules shall be suitable for the site conditions, must have proven successful operation in utility scale photovoltaic project considering the fact that site location is in highest corrosive environment.
- e) PV module shall perform satisfactorily with operational temperatures between minimum -40°C and maximum +85°C and shall be available to work under 0-85% relative humidity.
- f) The PV module shall be made of high-quality solar cells, laminated in ultraviolet stabilized polymer material like EVA, polyester and thermally toughened low iron tempered / heat strengthened glass and back sheet (Transparent) / glass material shall be high quality according to relevant international standards and IEC 61730.
- g) All materials used should have a proven history of reliability and stable operation in external applications. Each PV module shall be checked for conformity with the relevant standard and shall have positive power output tolerance only. No negative tolerance shall be accepted.
- h) PV module shall be provided with anti-corrosive/ weatherproof screw-fitted, having aluminum anodized finish frame (for framed module with coating thickness considering site corrosive nature) with DC cable and connector. In case the module is frameless, suitable retaining clips/ clamps used for installing the modules shall not damage the glass surface in contact with the retaining clamp.
- i) PV modules shall be equipped with minimum three bypass diodes to minimize power drop caused by shade. The module shall be designed for 1500 V dc system.
- j) Modules shall be made of light weight cells, resistant to abrasion, hail impact, rain, water and environmental pollution. The PV modules shall be provided with anti-reflection coating and back surface field structure to increase conversion efficiency.
- k) Efficiency of PV modules at standard test conditions (STC: Irradiation 1000 W/m², cell temperature 25°C and AM = 1.5) shall not be less than 20% and fill factor of the module shall not be less than 0.70.
- l) Module pig tail cables shall be UV resistant solar DC copper cable of lengths of 300 to 500 mm with maximum tolerance of +50 mm as per the project design requirement and of size 4 mm² with DC connectors adaptive to MC4 type connector directly. The junction box shall be split type with suitable cable connection between two PV Modules in a daisy chain arrangement. MC4 type connector should be TUV/ any accredited certified. The positive (+) terminal has a male connector while the negative (-) terminal has a female connector. However, any different design

ISSUE
R0



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 4 of 16



SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

and length of the pig tail cable offered (without any extra cost) shall be reviewed during detail engineering.

- m) The successful bidder shall submit the final Dimensions (with mounting holes) and technical data sheet (including all technical parameters) for all the offered Solar PV modules within 7 days from the date of issue of Lol.

2.2. REQUIREMENTS FROM BIDDER

Module manufacturers shall provide the methodology for handling, unloading, storage, installation, testing and commissioning of the PV module. Owner / GIPCL shall ensure that module shall be installed as per the furnished methodology. If required, module manufacturer would have to associate with the Owner's / GIPCL's installation and commissioning (I&C) agency.

Module OEM shall be responsible for loading the modules on suitable carriage. The details of transporters/ type of carriage for safe transportation of modules without breakage shall be explicitly communicated to Owner/ GIPCL and or BoS vendor of the concerned project.

Module manufacturer must provide a suitable checklist for safe unloading of modules and procedure for safe and proper storage of modules at site.

2.3. INSURANCE

The bidder's insurance liabilities pertaining to the scope of works are detailed out in elsewhere in bidding document.

2.4. EXCLUSIONS FROM THE SCOPE OF WORK

- i. Unloading of modules at site
- ii. Storage of SPV modules at site
- iii. Installation of SPV modules

3.0. MODULE WATTAGE DISTRIBUTION AND DEFECTIVE MODULE

3.1. MODULE WATTAGE DISTRIBUTION

The bidder can provide module (as allowed in technical specification) and wattage rounding off to 5 Wp for each type. Mandatory spares to be provided proportionate as indicated in price schedule for each type of module offered.



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 5 of 16

SCOPE OF WORK AND TECHNICAL SPECIFICATIONS



The bidder must necessarily meet the PV module wattage distribution as committed in the financial bid. The bidder is not permitted to offer lower wattage modules and no shortfall in the final weighted average Wp of the PV modules is allowed.

Bidder can supply higher power rating/ wattage modules of the same physical dimensions and same fixing holes dimensions and arrangement during final supply in case the need arises, subject to prior information and approval from Owner/ GIPCL. These higher power rating modules shall be supplied without any extra cost to Owner/ GIPCL. However, the committed number of PV modules as per original wattage distribution needs to be adhered to as the BoS package would be in advanced stage of erecting the tracker as per the original wattage distribution stated by PV module vendor.

3.2. DEFECTIVE MODULE

Following are few criteria for defective solar PV module:

- a) Physical:
 - i. Frame – sign of corrosion
 - ii. Back sheet – sign of bulging and decolouration
 - iii. Front glass – sign of cracks
 - iv. Cell – sign of decolouration and cracks

- b) Electrical:
 - i. Defective module is one with either Isc (short circuit current) or Voc (open circuit voltage) or their combination thereof less than 10% of average of 7-10 healthy modules of identical nominal rating.
 - ii. Hot spot: A hot spot shall be defined as difference in temperature within the PV module of 30° at 1000 W/m². The product warranty shall include an onsite hot spot testing procedure, setting the conditions under which the modules will have to be replaced.

Conditions for defective module

- i. The determination of defective modules shall be carried out for initial troubleshooting and preliminary assessment at site. In such a scenario, the defective modules shall be replaced with the healthy ones from mandatory spares by the O&M vendor to reduce the downtime of the solar PV plant.
- ii. The selection of healthy modules shall be done jointly by Engineer In-charge (in consultation with the module manufacturer and as per the approved technical documents, if any) and erection/ O&M Vendor.

ISSUE
R0



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 6 of 16



SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

- iii. Module shall also be declared as defective, if its output power is derated more than it's deemed Wp capacity taking consideration of yearly degradation. However, the responsibility for measuring the PV module performance output using reputed make PV analyzer etc., shall lie with erection/ O&M vendor.
- iv. Once these PV modules are categorized as defective PV modules at site, the responsibility and cost of further action to either transport to third-party laboratory for final assessment or replace the PV modules shall lie with the module manufacturer. The determined course of action shall be jointly finalized by module manufacturer and Owner/ GIPCL within reasonable time for settlement of the defective PV modules issue.
 - c) Bidder will replace/ rectify the defective PV modules within a reasonable time. In case of non-availability of same rating/ wattage as of the defective PV modules, bidder can supply higher power rating/ wattage modules of the same physical dimensions for replacement.
 - d) The period of replacement of defective modules shall be decided by engineer-in-charge based on the number of failed modules and availability of mandatory spares at site.

4.0. PROVENESS CRITERIA FOR SOLAR PV MODULES

In case the bidder is unable to meet the tender requirement by themselves, the bidder can sub-contract part or full procurement of PV modules for this package complying to the following conditions:

The sub-vendor or its holding company/ subsidiary company should be a PV module manufacturer with 540 Wp, or above rated PV module (Bi-facial) listed in the latest "ALMM" order issued by MNRE as on the last date of bid submission.

5.0. TECHNICAL PARTICULARS OF SOLAR PV MODULE

5.1. DATA SHEET

Bidder shall submit the data sheet for offered PV module in line with following table.

Table 1: Technical Details of Solar PV Modules

Sl. No.	Parameter	Unit	Technical Requirements	Bidder Reply
				*(with actual details)
A. General				



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 7 of 16

SCOPE OF WORK AND TECHNICAL SPECIFICATIONS



1.	Application	-	Utility scale ground mounted project	
2.	PV module manufacturer name	-	*	
3.	Country of origin of the PV module cell	-	*	
4.	Model no. of the PV module	-	*	
B. Technical Details				
1.	Cell type	-	Crystalline silicon – Bifacial (full/ half cut cell/ mono PERC/ n-type/ p-type)	
2.	Cells per module	No.	*	
3.	Type of design	-	With frame/ frameless	
	a) Frame material applicable only for modules with frame)	-	Corrosion resistant materials, coating of minimum 15 µm thickness and frame thickness of at least 30 mm ¹	
	b) Front glass and back sheet / back glass	-	*	
	i. Front glass type	-	High transmission, low iron, tempered glass with anti-reflective coating	
	ii Back sheet / glass	-	Transparent back sheet or Glass	
4.	Mounting arrangement - screw / clamp	-	Shall be clearly stated in the installation manual	
5.	Mounting hole distance (farthest holes along longer edge)	Mm	1400 ¹	
6.	Module dimension (L x W)	M	2274 x 1134 mm (with maximum permissible variation of ±10 mm in length and ±5 mm in width) ¹	



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 8 of 16



SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

7.	Weight	Kg	<33	
8.	Water quality requirement for washing the module in case of wet cleaning	-	Please provide the details	
C.	Electrical data			
1.	Electrical data			
	a) Nominal maximum power (Pmax) @ STC	Wp	540 to 570	
	b) Operating voltage (Vmp) @ STC	V	*	
	c) Operating current (Imp) @ STC	A	*	
	d) Open circuit voltage (Voc) @ STC	V	*	
	e) Short circuit current (Isc) @ STC	A	13.45-13.99 Amp.	
2.	Module efficiency at STC	%	20 (minimum)	
3.	Fill factor	%	70 (minimum)	
4.	Operating temperature	°C	-40 to +85	
5.	Maximum system voltage	V dc	1500	
6.	Power tolerance	Wp	0 to (+) 4.99	
7.	PID free solar cells	-	Yes (should comply with IEC 62804)	
8.	Current binning	-	Required 3 stage. Please mention the binning pattern. Module wattage bin offered shall not be less than 5 Wp.	
9.	Bifaciality factor	%	70 (minimum)	
10.	Packing (as per current binned)	-	Required	
11.	Module terminal box split type			
	a) IP	-	68	
	b) Terminal cable	-	UV protected cable	



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 9 of 16

SCOPE OF WORK AND TECHNICAL SPECIFICATIONS



			(copper)	
	c) Cable length	Mm	*	
	d) Terminal connector	-	Solar PV connector (MC4)	
12.	Temperature characteristics			
	a) Temperature coefficient of power (Pmax)	% / °C	*	
	b) Temperature coefficient of voltage (Voc)	% / °C	*	
	c) Temperature coefficient of current (Isc)	% / °C	*	
	d) Nominal operating cell temperature	°C	*	
13.	Bypass diode			
	a) Efficiency	%	> 99	
	b) Voltage drop	V	Not more than 0.7	
	c) Operating temperature	°C	(0 - 85)	
14.	Front Glass material			
	a) Glass thickness	Mm	Bidder to specify	
	b) Anti-reflective coating	-	Required	
	c) Transmittance value	%	90 (minimum)	
15.	Encapsulant	-	Should be UV resistant	
16.	Sealant to seal PV module edges and fix frames	-	Sealant should be made of silicone material	

* To be indicated by the bidder.

Note: 1: In case the successful bidder supplies PV modules of different make and/ or model or from different manufacturers, the fixing holes in the frame/ location of retaining clips, their location, diameter, center-to-center distance between them and all other attributes related to mounting should be same, if applicable.

5.2. STANDARD TESTING CONDITION AND QUALITY REQUIREMENTS

The applicable codes and standards are as mentioned below.

Table 2: Codes and Standards



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 10 of 16

SCOPE OF WORK AND TECHNICAL SPECIFICATIONS



Sl. No.	Codes and Standards Requirements	Bidder's Confirmation
1.	The PV module must qualify to either IEC 61215 (Ed. 2) or IS 14286: 2010 – Crystalline Silicon Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval (First Revision).	
2.	PV modules must qualify to IEC 61730 (Part 1 and 2), or IS/IEC 61730 for safety qualification and testing.	
3.	Corrosive atmosphere resistance testing to salt mist (IEC 61701 Ed. 2)	
4.	The PV modules manufacturer must have valid test certificates for their qualification as per IEC/ BIS standards by one of the NABL accredited test centers in India, in case such test facility may not exist in India, test certificate from reputed ILAC member body accredited labs abroad will be acceptable, and the type test reports shall be submitted for approval.	

5.3. QUALITY ASSURANCE PLAN

The minimum quality assurance/ quality control (QA/ QC) requirements and services bidder is expected to provide to assure "Quality Assurance" are described in this section. "Quality Assurance" is defined as the entire programme adopted by the Bidder during engineering, procurement and construction to assure conformity with the contract specifications. QA/ QC procedures proposed by the Bidder should address the QA/ QC requirements under the following phases of the project:

- a) Engineering - Prior to finalization of the contract, the bidder shall prepare and submit a product QA and QC that covers the engineering phases of work. The plan will be designed for this project and will address the specifics of how the bidder will control, monitor and verify the requirements contained in this section.
- b) Procurement - It is the Owner's intent that the bidder deals only with sub-manufacturers (vendors) of components who have established and demonstrated effective quality assurance and quality control programs. Owner does require, however, that the bidder perform such normal inspection of sub-manufacturers'/ vendors' work as is necessary to obtain equipment and materials conforming to the project specifications and their supporting documents (applicable codes and industry consensus standards) and good engineering, fabrication practices. Source quality control is also a valuable input for confirmation of delivery performance.
- c) Construction including commissioning testing - Owner will have a QA/ QC organization to



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 11 of 16

SCOPE OF WORK AND TECHNICAL SPECIFICATIONS



audit the bidder's QC effort. The assigned Owner's personnel will provide assurance to Owner's management that the work meets specifications, however, the basic inspection and quality control responsibility is vested with bidder.

Bidder shall submit documents to demonstrate that he (the bidder) and his sub-vendors possess QA/ QC programs, meeting the requirements set forth in this section and specified elsewhere in this tender document. Bidder shall prepare quality assurance plan (QAP) for all components to cover the overall quality assurance requirements and shall submit along with the bid.

5.4. MATERIALS INSPECTION PLAN – MANUFACTURING STAGE AND / OR PRE-DISPATCH INSPECTION

Following tests and/ or checks to be performed by manufacturer. These would be taken care during third party inspection (TPI) of module during manufacturing stage and/ or pre-dispatch inspection (PDI). Module QAP and quality checks shall be provided to Owner/ GIPCL prior to signing the final contract agreement.

Table 3: Pre-dispatch Inspection Test

Sl. No.	Sample Test	Sampling Reference/ Standard
1.	Visual/appearance	As per special inspection level S-4 and AQL 2.5% as per IS 2500 (Part 1): 2000
2.	RFID tag	As per special inspection level S-2 and AQL 1.5% as per IS 2500 (Part 1):2000
3.	Flash test and I-V curve measurement	As per special inspection level S-4 and AQL 1.5% as per IS 2500 (Part 1): 2000
4.	Electroluminescence (EL) testing	As per special inspection level S-2 and AQL 1.5% as per IS 2500 (Part 1):2000
5.	Insulation resistance test	Sampling as per special inspection level S-2 and AQL 1.5% as per IS 2500 (Part 1): 2000
6.	Robustness of termination test	One sample per lot as per IEC 61215 or IS 14286: 2010
7.	Mechanical load test	One sample per lot as per IEC 61215or IS 14286: 2010

This is an indicative list of tests/ checks. The manufacturer/ bidder is to furnish a detailed quality plan indicating the practice and procedure along with relevant supporting documents. Visual and EL acceptance criterion to be submitted along with MQP.



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 12 of 16

SCOPE OF WORK AND TECHNICAL SPECIFICATIONS



1. GIPCL has right to inspect during manufacturing of the ordered quantity starting from incoming raw material till packaging and dispatch.
2. Random sample shall be selected by authorized agency in consultation with GIPCL's/ Owner's representative to carry out laboratory test prior to issuance of material dispatch clearance certificate (MDCC).
3. All the test expenses such as transportation, obtaining certificates etc. related to PV module testing at laboratory shall be borne by the supplier.
4. Standard packaging process followed by bidder shall be shared with Owner prior to signing the contract agreement. In case of any modification suggested by third party inspecting agency, the same shall be incorporated by the bidder.
5. All above tests to be carried out as per agreed schedule.
6. Reference cell or module shall be calibrated in compliance with IEC specification and tender specification prior to manufacturing of each batch.
7. The following standard to be complied by the supplier's related to sampling procedure and safety of the PV module.
 - i. IS 2500 (Part 1): 2000– Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
 - ii. IS 14286: 2010 – Crystalline Silicon Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval, (First Revision) or any other latest revision as applicable for the ALMM / BIS Approvals.
 - iii. IS/IEC 61730-2:2004 – Photovoltaic (PV) Module Safety Qualification, Part 1: Requirements for Construction or any other latest revision as applicable for the ALMM / BIS Approvals.
8. The supplier shall propose the schedule for pre-dispatch inspection of finished goods to Owner/ GIPCL well in advance, and in no case less than fifteen (15) days prior to commencement of inspection.

5.5. LABELLING AND NAME PLATE REQUIREMENT

Labelling Requirement:

All PV modules shall be classified prior to their packing at the manufacturer's workplace to reduce

ISSUE
R0



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 13 of 16

SCOPE OF WORK AND TECHNICAL SPECIFICATIONS



the mismatch losses by sorting on basis of power bin and current bin positivity.

The manufacturer shall paste labels of colors red, yellow and green on the side frames of modules to differentiate between the tolerance values high, medium and low apart from usual labels “H”, “M” and “L”. This will help the site execution team to segregate the modules faster and connect modules with same tolerance in almost each string.

Name Plate Requirement:

All individual modules shall be provided with name plate label at the back of module which shall provide the information given below for identification. They shall be clearly visible and shall not be hidden by equipment wiring. Type of labels and fixing of labels shall be such that they are not likely to peel off/ fall off during the life of the PV module.

- i. Manufacturer’s name
- ii. Model number and serial number
- iii. Overall dimensions (W x L x D)
- iv. Weight
- v. Maximum power (P_{MAX}), voltage (V_{MP}) and current (I_{MP})
- vi. Short circuit current (I_{sc}) and open circuit voltage (V_{oc})
- vii. Main system voltage
- viii. Relevant standards and certification laboratory name.
- ix. GIPCL Logo on the top corner of each Module (Design shall be provided to successful Bidder during detail engineering).
- x. Warnings, if any

5.6. INSURANCE REQUIREMENT

- a) The Bidder shall quote the price including insurance charges for delivery of the panels from manufacturing plant till the project site. The insurance shall cover against any breakage, damages during loading, transportation, transshipment, and handling.
- b) Bidder shall ensure the registration of the project and the serial no. of PV modules supplied for this project in their insurance coverage scheme to ensure that the buyer can get the insurance cover at times of necessity.
- c) Bidder shall submit the proof of such registration immediately after each lot of dispatch of materials.

5.7. INSTALLATION REQUIREMENTS

Module installation shall be carried out by qualified personal and as per manufacturer

ISSUE
R0



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 14 of 16

SCOPE OF WORK AND TECHNICAL SPECIFICATIONS



recommendations. However, PV module shall have the following requirements. This is mainly based on certain site and/ or project specific aspects.

- a) In a string, PV module may be physically connected in different configuration(s)/ arrangement(s).
- b) PV module shall be installed with mounting holes using nut-bolt/ clamping arrangement. In case of nut-bolt arrangement, at least 4 points of connection are required between each module and the mounting surface.
- c) Grounding holes shall be provided for all PV module (framed module).
- d) PV modules must be compatible for robotic cleaning. Bidder shall certify the PV module suitable to be cleaned by any type of robotic cleaning system. Any deviation in quality and performance of PV module shall be the responsibility of bidder and bidder shall take all necessary corrective action to replenish the performance and replace the poor-quality materials with new one.

Bidder shall be provided module installation manual to the Owner prior to signing the final contract agreement.

5.8. RFID REQUIREMENTS

Identification and Traceability:

Each PV module must use a radio frequency identification (RFID) tag. This can be inside or outside the laminate but must be able to withstand harsh environmental conditions and last the lifetime of the solar module as per latest MNRE norms. The following information must be mentioned in the RFID used on each module.

1. Name of the manufacturer of the PV module
2. Name of the manufacturer of solar cell
3. Month and year of the manufacture (separately for solar cells and modules)
4. Country of origin (separately for solar cell and module)
5. I-V curve for the module at STC (1000 W/m², AM 1.5, 25°C)
6. Wattage, I_m, V_m and FF for the PV module
7. Unique serial no. and model no. of the PV module
8. Date and year of obtaining IEC PV module qualification certificate
9. Name of the test lab issuing IEC certificate
10. Other relevant information on traceability of solar cells and module as per ISO 9001.

Site owners would be required to maintain accessibility to the list of module IDs along with the above parametric data for each module.

ISSUE
R0



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 15 of 16

SCOPE OF WORK AND TECHNICAL SPECIFICATIONS



One number RFID reader must be supplied for each 50 MWp by the bidders which are to be compatible to read the data from the RFID tag and download the data to computer. All associated software and cables are to be provided along with the RFID reader.

5.9. GUARANTEE AND WARRANTY

Bidder shall submit the guarantee and warranty as per Table 3.

Table 4: Guarantee and Warranty

Sl. No.	Item	Unit	Technical Requirements	Bidder's Data *
1.	Module efficiency			
a)	Guaranteed efficiency @ STC	%	20% (minimum)	
2.	Performance data			
a)	Performance warranty	Year	25	
b)	Power warranty	%	Each solar PV module should carry a performance warranty of > 90% during the first 10 years and >80% during the next 15 years.	
c)	Module power output tolerance	W	0 W to (+) 4.99 Wp, negative tolerance is strictly not allowed.	
d)	Degradation curve	-	25 years (annual degradation curve shall be provided)	
3.	Guaranteed degradation (year basis)			
a)	First year (including LID)	%	<3.0	
b)	Second year to 25 th year	%	<0.7	
4.	Material warranty			
a)	Product warranty (defects in materials and workmanship)	Year	12	

6.0. DATA TO BE FURNISHED ALONG WITH THE BID



**SUPPLY OF SOLAR PV MODULES FOR 500 MW(AC)
(625 MWp) SOLAR PV PROJECT IN RE PARK, KHAVDA,
GREAT RANN OF KUTCH, GUJARAT**

SECTION – 8
SHEET 16 of 16



SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

- a) All required details to be filled by bidder as per Table 1, Table 2, and Table 4.
- b) Module data sheet
- c) PAN file for module (certified by a third party)
- d) IEC test certificates
- e) Module installation manual
- f) BoM elaborating on the properties, such as, thickness, material composition etc. of the major components of the module which shall be the same as per the type tested and approved constructional data form (CDF).