**ಚಾಮುಂಡೇಶ್ವರಿ ವಿದ್ಯುತ್‌ ಸರಬರಾಜು ನಿಗಮ ನಿಯಮಿತ CHAMUNDESHWARI ELECTRICITY SUPPLY COMPANY LIMITED**

**Details for Empanelment under simplification of procedure**

1. **About the Scheme:**

The Ministry of New and Renewable Energy (MNRE), Government of India, is implementing Phase-II of Grid Connected Rooftop Solar (GCRTS) Programme wherein Central Financial Assistance (CFA) or subsidy is being provided for installation of Roof Top Solar (RTS) plants on rooftops of Residential Buildings.

In order to protect the interests of beneficiaries and ensure that the vendors installing the rooftop solar plants have the requisite expertise, follow minimum specifications and standards specified by the Ministry and maintain the plant for at least five years from the date of installation, it has been decided that such vendors have to register/empanel themselves with the beneficiaries’ Distribution Utility (DISCOM).

Vendors willing to register/empanel themselves in the Programme under simplified procedure may get themselves registered with the consumers’ DISCOM by submitting an application along with declaration and depositing a PBG of Rs. 2,50,000/- (Rupees Two Lakh Fifty Thousand only) valid for at least five years. The vendors can submit the application at the General Manager Projects Corporate office CESC Mysuru.

The CFA/subsidy pattern is as shown below.

|  |  |
| --- | --- |
| **Type of Residential Sector** | **CFA (as percentage of bench mark cost or cost discovered through competitive process whichever is lower)** |
| Residential sector  (Maximum upto 3kW capacity) | 40% of bench mark cost |
| Residential sector  (above 3kW capacity and upto 10kW capacity) | 40% upto 3kW  Plus 20% for RTS system above 3kW and upto 10kW |
| Group Housing Societies/ Residential Welfare Associations (GHS/RWA) etc. for common facilities up to 500 kWp (@10kWp per house), with the upper limit being inclusive of individual rooftop plants already installed by individual residents in that GHS/RWA at the time of installation of RTS for common activity. | 20% |

1. **Scope of Work:**

**The detailed Scope of Work for empanelled vendors shall essentially cover but not be limited to:**

* 1. Identification of prospective beneficiaries and providing necessary assistance to the prospective beneficiary in submitting online applications for installation of RTS project.
  2. Obtaining approval from CESC for providing grid connectivity.
  3. Submission of proposal with all required documents to CESC for sanctioning of the project.
  4. Execution of the work shall be carried out in an approved manner as per the technical specification of RFP. In case of any dispute, relevant MNRE/BIS/ ISI/NABL/ISO/IEC/IS/CESC specification shall be followed and work shall be carried out to the reasonable satisfaction of the engineer in charge.
  5. The vendor shall complete the work of Design, supply, civil work, erection, testing and commissioning of SPV grid connected Power Plant within 180 days from the issuance of the approval letter or the last date of the project timeline specified by MNRE to CESC i.e. 19.01.2024, whichever is earlier. In event of failure to install and commission the RTS system within the mentioned timeframe, the entire Performance Bank Guarantee will be forfeited and may also lead to disqualification of the vendor at the sole discretion of CESC. The penalty for non-completion will be on pro-rata basis.
  6. The work covers Design, supply, installation, commissioning and Comprehensive Maintenance Contract (CMC) for 05 (Five) Years.
  7. All the material required for the installation of solar power plant as per the work order/award/work approval letter issued shall be kept at site in custody of the vendor, CESC shall not be responsible for any loss or damage of any material during the installation. The vendor shall be responsible and take an insurance policy for transit-cum-storage-erection for all the materials.
  8. The vendor shall take entire responsibility of electrical safety of the installations including connectivity with the grid and follow all the safety rules and regulations applicable as per Indian Electricity Act-2003 and prevailing CEA guidelines and amendments, it shall be responsibility of the vendor to take NOC from concerned authority and engage person as per provisions as per in CEA Rules and Regulations.

The Empanelled vendor shall ensure proper safety of all the workmen, material, plants and equipment belonging to him/her. In case any accident occurs during the construction / erection or during guarantee period for work undertaken by Empanelled Vendor thereby causing any minor or major or fatal accident will be the responsibility of the Empanelled Vendor. The successful Vendors shall follow and comply with the employer’s safety rules relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment. The Empanelled vendors shall also arrange all certificates and test reports of the module and inverter and other equipment.

* 1. Inverters from IEC/BIS standards empanelled manufacturer shall be used under this project.
  2. Assisting in execution of Power Purchase Agreement (PPA) in the Commission approved standard format as per KERC regulations between Consumer & CESC i.e., the empaneled vendor shall educate the Consumer to execute PPA with CESC within stipulated time.
  3. Empanelled vendors shall establish a service Centre to cater the 05 Years CMC. The details of such service centres (address, contact no. etc.) will be made available on the website of the CESC Mysuru
  4. Obtaining Net-metering approval from Metering Division of CESC Mysuru for providing grid connectivity/net-metering.
  5. Empanelled vendors should use only indigenously manufactured PV panels as per Office Memorandum issued by the Ministry Of New and Renewable Energy (MNRE) dated 10th March 2021 (<https://mnre.gov.in/img/documents/uploads/file_f1615380939218.pdf> ) Approved List of Models & Manufacturers (ALMM) for Solar PV Modules as on 10.03.2021 for the said project.
  6. The SRTPV plant installations shall be implemented as per Solar Rooftop Photovoltaic Power plants Regulations, 2016 and Generic tariff orders issued by the Commission from time to time.
  7. In the event of the information furnished by the Bidder is found to be false at any stage, CESC reserves right to take action against such Bidders and may result in forfeiture of the Bid security deposit, disqualify and black list the firm.
  8. Any escalation in taxes/levies/duties during the period of the project shall not be paid. Bidders are advised to take in to considerations any such escalations in the prevailing taxes/levies/duties. No escalation shall be granted on any reasons what so ever.

1. **Acceptance of the Tender:**

The final acceptance of the Tender is entirely vested with CESC who reserves the right to accept or reject any or all of the Tenders in full or in part. The Tender accepting authority may also reject any tender for reasons such as changes in the new technologies, court orders, accidents or calamities and other unforeseen circumstances. After acceptance of the Tender by CESC, the Bidder shall have no right to withdraw their Tender or claim higher price.

1. **Execution of Agreement:**
   1. The Successful Bidders shall execute a Contract in the INR 200 non-judicial stamp paper bought in Mysuru only in the name of the Bidder, within 30 days from the date of receipt of the Letter of Intent issued by CESC (including the receipt date).
   2. The Successful Bidders shall not assign or make over the contract, the benefit or burden thereof to any other person or persons or body corporate for the execution of the contract or any part thereof. CESC reserves its right to cancel the work order either in part or full, if this condition is violated.
   3. In case the successful bidder fails to execute necessary agreements as prescribed, within the stipulated period, then action will be initiated as per the EMD declaration form submitted by successful bidder and such bidder’s tender will be treated as non-responsive.
2. **Guarantee/Warranty:**
   1. The Contractor shall warrant that the Equipment supplied by him will be new, unused and in accordance with the Contract Documents and free from defects in Material, as indicated in below table and Workmanship for One year or for the entire duration of Contract Period whichever is earlier:

|  |  |
| --- | --- |
| **Material** | **Warranty in no. of years** |
| Solar PV modules including structures, | Minimum 5 years or manufacturer warranty period whichever is earlier |
| Standard PV module performance warranty from the manufacturer | 25 years |
| Inverters | Minimum 5 year or Manufacturer warranty period whichever is higher |
| Bi-directional meters & other materials | 5 years |
| DC cables, AC cables, Array Junction Box, Lighting Arrestors | One year |

* 1. The repaired or new parts shall be installed free of Cost by the Contractor. If any repair is carried out on his behalf at the Site, the Contractor shall bear the Cost of such repairs.
  2. The acceptance of the Equipment by the Engineer shall in no way relieve the Contractor of his obligations under the Guarantee Clause.
  3. If the Solar Rooftop PV power plant system plant is not functional, the same should be repaired or restored or replaced within 3 days.
  4. If the successful bidder, having been notified, fails to rectify the defect(s) and restore the SRTPV system to good working condition within the period of 3 days, a penalty at the rate of 0.25 % per week subjected to maximum of 3% reckoned will be levied. This will be deducted from the bills due.

1. **Commissioning:**

The plant shall be commissioned in the presence of CESC authorized personnel or its nominated representative.

1. **FACILITIES TO BE PROVIDED BY THE CONTRACTOR**
   1. **Tools, tackles and scaffoldings**

The Contractor shall provide all the construction equipment; tools, tackles and scaffoldings required for pre-assembly, erection, testing and commissioning of the equipment covered under the Contract. He shall submit a list of all such materials to the Engineer before the commencement of pre-assembly at Site. These tools and tackles shall not be removed from the Site without the written permission of the Engineer.

* 1. **Communication**

The Owner will extend the telephone and telex facilities, if available at Site, for purposes of Contract. The Contractor shall be charged at actual for such facilities.

* 1. **First-aid**

The Contractor shall provide necessary first-aid facilities for all his employees, representatives and workmen working at the Site. Enough number of Contractor’s personnel’s shall be trained in administering first-aid.

* 1. **Cleanliness**
  2. The Contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish, debris etc. during the period of Contract. The Contractor shall employ enough number of special personnel to thoroughly clean his work-area at least once in a day. All such rubbish and scrap material shall be stacked or disposed off in a place to be identified by the Engineer. Materials and stores shall be so arranged to permit easy cleaning of the area. In areas where equipment might drip oil and cause damage to the floor surface, a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect the floor from such damage.
  3. Similarly the labour colony, the offices and the residential areas of the Contractor’s employees and workmen shall be kept clean and neat to the entire satisfaction of the Engineer. Proper sanitary arrangement shall be provided by the Contractor, in the work-areas, office and residential areas of the Contractor.

1. **WORK & SAFETY REGULATIONS**
   1. The Contractor shall ensure proper safety of all the workmen, materials, plant and equipment belonging to him or to the Owner or to others, working at the Site. The Contractor shall also be responsible for provision of all safety notices and safety equipment required both by the relevant legislations and the Engineer, as he may deem necessary.
   2. The Contractor will notify well in advance to the Engineer of his intention to bring to the Site any container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals which may involve hazards. The Engineer shall have the right to prescribe the conditions, under which such container is to be stored, handled and used during the performance of the works and the Contractor shall strictly adhere to and comply with such instructions. The Engineer shall have the right at his sole discretion to inspect any such container or such construction plant/equipment for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its use. No claim due to such prohibition shall be entertained by the Owner and the Owner shall not entertain any claim of the Contractor towards additional safety provisions/conditions to be provided for/constructed as per the Engineer’s instructions.
   3. Further, any such decision of the Engineer shall not, in any way, absolve the Contractor of his responsibilities and in case, use of such a container or entry thereof into the Site area is forbidden by the Engineer, the Contractor shall use alternative methods with the approval of the Engineer without any cost implication to the Owneror extension of work schedule.
   4. Where it is necessary to provide and/or store petroleum products or petroleum mixtures and explosives, the Contractor shall be responsible for carrying-out such provision and/or storage in accordance with the rules and regulations laid down in Petroleum Act 1934, Explosives Act, 1948 and Petroleum and Carbide of Calcium Manual published by the Chief Inspector of Explosives of India. All such storage shall have prior approval of the Engineer. In case, any approvals are necessary from the Chief Inspector (Explosives) or any statutory authorities, the Contractor shall be responsible for obtaining the same.
   5. All equipment used in construction and erection by Contractor shall meet Indian/International Standards and where such standards do not exist, the Contractor shall ensure these to be absolutely safe. All equipment shall be strictly operated and maintained by the Contractor in accordance with manufacturer’s Operation Manual and safety instructions and as per Guidelines/rules of the Ownerin this regard.
   6. Periodical examinations and all tests for all lifting/hoisting equipment & tackles shall be carried-out in accordance with the relevant provisions of Factories Act 1948, Indian Electricity Act 1910 and associated Laws/Rules in force from time to time. A register of such examinations and tests shall be properly maintained by the Contractor and will be promptly produced as and when desired by the Engineer or by the person authorised by him.
   7. The Contractor shall provide suitable safety equipment of prescribed standard to all employees and workmen according to the need, as may be directed by the Engineer who will also have right to examine these safety equipment to determine their suitability, reliability, acceptability and adaptability.
   8. Where explosives are to be used, the same shall be used under the direct control and supervision of an expert, experienced, qualified and competent person strictly in accordance with the Code of Practice/Rules framed under Indian Explosives Act pertaining to handling, storage and use of explosives.
   9. The Contractor shall provide safe working conditions to all workmen and employees at the Site including safe means of access, railings, stairs, ladders, scaffoldings etc. The scaffoldings shall be erected under the control and supervision of an experienced and competent person. For erection, good and standard quality of material only, shall be used by the Contractor.
   10. The Contractor shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to the Owner or other Contractors under any circumstances, whatsoever, unless expressly permitted in writing by the Owner to handle such fuses, wiring or electrical equipment
   11. Before the Contractor connects any electrical appliances to any plug or socket belonging to the other Contractor or Owner, he shall:

a. Satisfy the Engineer that the appliance is in good working condition;

b. Inform the Engineer of the maximum current rating, voltage and phases of the appliances;

c. Obtain permission of the Engineer detailing the sockets to which the appliances may be connected.

* 1. The Engineer will not grant permission to connect until he is satisfied that;

a. The appliance is in good condition and is fitted with suitable plug;

1. The appliance is fitted with a suitable cable having two earth conductors, one of which shall be an earthed metal sheath surrounding the cores.
   1. No electric cable in use by the Contractor/Owner will be disturbed without prior permission. No weight of any description will be imposed on any cable and no ladder or similar equipment will rest against or attached to it.
   2. No repair work shall be carried out on any live equipment. The equipment must be declared safe by the Engineer and a permit to work shall be issued by the Engineer before any repair work is carried out by the Contractor. While working on electric lines/equipment, whether live or dead, suitable type and sufficient quantity of tools will have to he provided by the Contractor to electricians/workmen/ officers.
   3. The Contractors shall employ necessary number of qualified, full time electricians/electrical supervisors to maintain his temporary electrical installation.
   4. The Contractor employing more than 50 workmen whether temporary, casual, probationer, regular or permanent or on contract, shall employ at least one full time officer exclusively as safety officer to supervise safety aspects of the equipment and workmen, who will coordinate with the Project Safety Officer. In case of work being carried out through Sub-Contractors, the Sub-Contractor’s workmen/employees will also be considered as the Contractor’s employees/workmen for the above purpose.

The name and address of such Safety Officers of the Contractor will be promptly informed in writing to Engineer with a copy to Safety Officer-In charge before he starts work or immediately after any change of the incumbent is made during currency of the Contract.

* 1. In case any accident occurs during the construction/ erection or other associated activities undertaken by the Contractor thereby causing any minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to the Engineer in prescribed form and also to all the authorities envisaged under the applicable laws.
  2. The Engineer shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and/or property, and/or equipment. In such cases, the Contractor shall be informed in writing about the nature of hazards and possible injury/accident and he shall comply to remove shortcomings promptly. The Contractor after stopping the specific work can, if felt necessary, appeal against the order of stoppage of work to the Engineer within 3 days of such stoppage of work and decision of the Engineer in this respect shall be conclusive and binding on the Contractor.
  3. The Contractor shall not be entitled for any damages/compensation for stoppage of work due to safety reasons as provided in clause 31.18 above and the period of such stoppage of work will not be taken as an extension of time for completion of work and will not be the ground for waiver of levy of liquidated damages.
  4. It is mandatory for the Contractor to observe during the execution of the works, requirements of Safety Rules which would generally include but not limited to following:

1. **Safety Rules**
   1. Each employee shall be provided with initial indoctrination regarding safety by the Contractor, so as to enable him to conduct his work in a safe manner.
   2. No employee shall be given a new assignment of work unfamiliar to him without proper introduction as to the hazards incident thereto, both to himself and his fellow employees.
   3. Under no circumstances shall an employee hurry or take unnecessary chance when working under hazardous conditions.
   4. Employees must not leave naked fires unattended. Smoking shall not be permitted around fire prone areas and adequate fire fighting equipment shall be provided at crucial location.
   5. Employees under the influence of any intoxicating beverage, even to the slightest degree shall not be permitted to remain at work.
   6. There shall be a suitable arrangement at every work site for rendering prompt and sufficient first aid to the injured.
   7. The staircases and passageways shall be adequately lighted.
   8. The employees when working around moving machinery must not be permitted to wear loose garments. Safety shoes are recommended when working in shops or places where materials or tools are likely to fall. Only experienced workers shall be permitted to go behind guard rails or to clean around energized or moving equipment.
   9. The employees must use the standard protection equipment intended for each job. Each piece of equipment shall be inspected before and after it is used.
   10. Requirements of ventilation in underwater working to licensed and experienced divers, use of gum boots for working in slushy or in inundated conditions are essential requirements to be fulfilled.
   11. In case of rock excavation, blasting shall invariably be done through licensed blasters and other precautions during blasting and storage/transport of charge material shall be observed strictly.
   12. The Contractor shall follow and comply with the Owner’sSafety Rules, relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment as may be prescribed from time to time without any demur, protest or contest or reservations. In case of any discrepancy between statutory requirement and Owner’s Safety Rules referred above, the latter shall be binding on the Contractor unless the statutory provisions are more stringent.
   13. If the Contractor fails in providing safe working environment as per Owner’s Safety Rules or continues the work even after being instructed to stop work by the Engineer as provided in clause 31.18 above, the Contractor shall promptly pay to the Owner, on demand by the Owner, compensation at the rate of Rs.5,000/- per day of part thereof till the instructions are complied with and so certified by the Engineer. However, in case of accident taking place, causing injury to any individual, the provisions contained in clause 31.23 shall also apply in addition to compensation mentioned in this clause.
   14. **If the Contractor does not take all safety precautions and/or fails to comply with the Safety Rules as prescribed by the Owner or under the applicable law for the safety of the equipment and plant and for the safety of personnel and the Contractor does not prevent hazardous conditions which cause injury to his own employees or employees of other Contractors or** **Owner’s employees or any other person who are at Site or adjacent thereto, the Contractor shall be responsible for payment of compensation to the Owner as per the following schedule:**

**a. Fatal injury or accident : Rs. 1,00,000/-**

**causing death per person**

1. **Major injuries or accident causing : Rs. 20,000/-**

**25% or more permanent disablement per person**

**to Workmen or employees**

*(These are applicable for death / injury to any person, whatsoever)*

Permanent disablement shall have same meaning as indicated in Workmen’s Compensation Act. The compensation mentioned above shall be in addition to the compensation payable to the workmen/employees under the relevant provisions of the Workmen’s Compensation Act and rules framed there under or any other applicable laws as applicable from time to time. In case the Owner is made to pay such compensation then the Contractor is liable to reimburse the Owner such amount in addition to the compensation indicated above.

* 1. If the Contractor observes all the Safety Rules and Codes, Statutory Laws and Rules during the currency of Contract awarded by the Owner and no accident occurs then the Owner may consider the performance of the Contractor and award suitable ‘ACCIDENT FREE SAFETY MERITORIOUS AWARD’ as per scheme as may be announced separately from time to time.

1. **REPLACEMENT OF DEFECTIVE PARTS AND MATERIALS**
   1. If during the performance of the Contract, the Engineer shall decide and inform in writing to the Contractor that the Contractor has manufactured any equipment, material or part of equipment unsound and imperfect or has furnished any equipment inferior to the quality specified, the Contractor on receiving details of such defects or deficiencies shall at his own expense within seven (7) days of his receiving the notice, or otherwise, within such time as may be reasonably necessary for making it good, proceed to alter, reconstruct or remove such works and furnish fresh equipment/materials up to the standards of the specifications. In case, the Contractor fails to do so, the Engineer may on giving the Contractor seven (7) days notice in writing of his intentions to do so, proceed to remove the portion of the works so complained of and at the cost of the Contractor perform all such Works or furnish all such equipment/ material provided that nothing in this clause shall be deemed to deprive the Owner of or affect any rights under the Contract which the Owner may otherwise have in respect of such defects and deficiencies.
   2. The Contractor’s full and extreme liability under this clause shall be satisfied by the payment to the Owner of extra cost, of such replacement procured including erection as provided for in the Contract, such extra cost being the ascertained difference between the price paid by the Owner for such replacements and the Contract Price by portion for such defective equipment/materials/works and repayments of any sum paid by the Owner to the Contractor in respect of such defective equipment/material. Should the Owner not so replace the defective equipment/materials the Contractor’s extreme liability under this clause shall be limited to repayment of all sums paid by the Owner under the Contract for such defective equipment/materials.
2. **TRAINING OF OWNER’S PERSONNEL**
   1. If applicable the Contractor shall undertake to train free of cost, Engineering personnel selected and sent by the Owner at the works of the Contractor unless otherwise specified in the Technical Specifications. The period and the nature of training for the individual personnel shall be agreed upon mutually between the Contractor and the Owner. These Engineering personnel shall be given special training in the shops, where the equipment will be manufactured and/or in their Collaborator’s works and where possible, in any other plant where equipment manufactured by the Contractor or his collaborator is under installation, operation, or testing to enable those personnel to become familiar with the equipment being furnished by the Contractor. The details of the number of persons to be trained, period of training, nature of training etc. shall be as outlined in accompanying Technical Specifications/Special Conditions of Contract.
   2. All traveling and living expenses for the Engineering personnel to be trained during the total period of training will be borne by the Owner. These Engineering personnel, while undergoing training, shall be responsible to the Contractor for discipline.
   3. The Owner shall not be entitled for any rebate, whatsoever, on any account in the event of his failing to avail of the training facilities, for any reason.
3. **PROGRESS REPORTS AND PHOTOGRAPHS** 
   1. During the various stages of the work in pursuance of the Contract, the Contractor shall at his own cost submit periodic progress reports as may be reasonably required by the Engineer with such materials as, charts, net-works, photographs, test certificates, etc. Such progress reports shall be in the form and size as may be required by the Engineer and shall be submitted in at least three (3) copies.
   2. If the contractor does not maintain the rate of progress as required and if the progress of any particular portion of work is found unsatisfactory, the CESC is entitled to take action at his discretion in order to maintain the rate of progress after giving the contractor 7 days’ notice in writing, whereupon the supplier will have no claim for any compensation for any loss sustained by him owing to such actions.
   3. The contract shall submit the plant performance progress report in triplicate electronic media copies within 5th of every month in Proforma mutually discussed and agreed between the CESC and the contractor. The successful bidder shall submit the progress report to the concerned Section officer, Sub-divisional office and Division office.
   4. CESC will have the right to depute representatives to ascertain the progress of contract at the premises of works of the contractor
4. **COMMISSIONING REPORT IN MNRE PCR FORMAT**

On successful commissioning of the SRTPV plant, the successful bidder shall submit all the data pertaining to Project Completion Report (PCR) Format of MNRE, GoI.

1. **TAKING OVER**

Upon successful completion of all the tests to be performed at Site on equipment furnished and erected by the Contractor, the Engineer shall issue to the Contractor a Taking Over Certificate as a proof of the final acceptance of the equipment. Such certificate shall not unreasonably be withheld nor will the Engineer delay the issuance thereof on account of minor omissions or defects, which do not affect the commercial operation and/or cause any serious risk to the equipment. Such certificate shall not relieve the Contractor of any of his obligations which otherwise survive, by the terms and conditions of the Contract after issue of such certificate.

1. **DELAYS BY OWNER OR HIS AUTHORISED AGENTS**

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* 1. In case the Contractor’s performance is delayed due to any act of omission on the part of the Owner or his authorized agents, then the Contractor shall be given due extension of time for the completion of the Works, to the extent such omission on the part of the Owner has caused delay in the Contractor’s performance of the Contract.

Regarding reasonableness or otherwise of the extension of time, the decision of the Engineer shall be final.

* 1. In addition, the Contractor shall be entitled to claim demonstrable and reasonable compensation if such delays have resulted in any increase in cost. The Owner shall examine the justification for such a request for claim and if satisfied, the extent of compensation shall be mutually agreed depending upon the circumstances at the time of such an occurrence.

1. **DEMURRAGE, WHARFAGE, ETC.**

All demurrage, wharfage and other expenses incurred due to delayed clearance of the material or any other reason shall be to the account of the Contractor.

1. **FORCE MAJEURE**
   1. Force majeure is herein defined as any cause which is beyond the control of the Contractor or the Owner as the case may be, which they could not foresee or with a reasonable amount of diligence could not have foreseen and which substantially affects the performance of the Contract, such as:

a. Natural phenomena, including but not limited to floods, droughts, earthquakes and epidemics;

b. Acts of any Government, domestic or foreign, including but not limited to war, declared or undeclared, priorities, guarantees, and embargoes.

Provided either party shall within fifteen (15) days from the occurrence of such a cause notify the other in writing of such causes.

* 1. The Contractor or the Owner shall not be liable for delays in performing his obligations resulting from any force majeure cause as referred to and/or defined above

The date of completion will, subject to hereinafter provided, be extended by a reasonable time even though such cause may occur after Contractor’s performance of obligation has been delayed due to other causes.

1. **SUSPENSION OF WORK**
   1. The Owner reserves the right to suspend and reinstate execution of the whole or any part of the Works without invalidating the provisions of the Contract. Orders for suspension or reinstatement of the Works will be issued by the Engineer to the Contractor in writing. The time for completion of the works will be extended for a period equal to duration of the suspension.
   2. Any necessary and demonstrable cost incurred by the Contractor as a result of such suspension of the works will be paid by the Owner, provided such costs are substantiated to the satisfaction of the Engineer. The Owner shall not be responsible for any liabilities if suspension or delay is due to some default on the part of the Contractor or his Sub-Contractor.

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1. **CONTRACTOR`S DEFAULT**
   1. If the Contractor shall neglect to execute the works with due diligence and expedition or shall refuse or neglect to comply with any reasonable order given to him, in writing by the Engineer in connection with the works or shall contravene the provisions of the Contract, the Owner may give notice in writing to the Contractor to make good the failure, neglect or contravention complained of. Should the Contractor fail to comply with the notice within thirty (30) days from the date of serving the notice, then and in such case the Owner shall be at liberty to employ other workmen and forthwith execute such part of the works as the Contractor may have neglected to do or if the Owner shall think fit, without prejudice to any other right he may have under the Contract to take the work wholly or in part out of the Contractor’s hands and re-contract with any other person or persons to complete the works or any part thereof and in that event the Owner shall have free use of all Contractor’s equipment that may have been at the time on the Site in connection with the works without being responsible to the Contractor for fair wear and tear thereof and to the exclusion of any right of the Contractor over the same, and the Owner shall be entitled to retain and apply any balance which may otherwise be due on the Contract by him to the Contractor, or such part thereof as may be necessary, to the payment of the cost of executing the said part of the Works or of completing the Works as the case may be. If the cost of completing of works or executing part thereof as aforesaid shall exceed the balance due to the Contractor shall pay such excess. Such payment of excess amount shall be independent of the liquidated damages for delay, which the Contractor shall have to pay if the completion of works is delayed.
   2. In addition, such action by the Owner as aforesaid shall not relieve the Contractor of his liability to pay liquidated damages for delay in completion of Works as defined in Clause 14.0 of this Section.
2. Such action by the Owner as aforesaid the termination of the Contract under this clause shall not entitle the Contractor to reduce the value of the Contract Performance Guarantee nor the time thereof. The Contract Performance Guarantee shall be valid for the full value and for the full period of the Contract including guarantee period.
3. **Definition of SRTPV Plant and Plant Capacity:**

**PV System” or “SPV” or “ SPV System or SRTPV system**” shall for the purpose of this scheme mean the Grid-connected Rooftop Solar Photo-Voltaic (PV) system including the PV modules, grid-connected inverter(s), module mounting structure(s), cables and connectors, safety and Earthing equipment, interconnection equipment, and inverter with remote monitoring with other components for Rooftop Solar System that shall be supplied, installed, commissioned and maintained by the Empanelled Agency.

**Plant capacity**’ means DC Capacity i.e., total solar total wattage of all of solar panels connected. The plant capacity of the SRTPV Plant installed at the Consumer premises shall be less than or equal to the sanctioned load of the Consumer. Inverters shall be installed equal to or nearer to next higher capacity of the plant as arrived above.

* 1. **Project Plan**

Implementation plan and schedule is as detailed below

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| --- | --- | --- | --- |
| **Sl.No** | **Activity** | **Responsibility** | **Timeline**  **(Max Working Days)** |
| 1 | Submission of online applications | Consumer | Zero date |
| 2 | Acknowledgment of application by CESC | CESC |
| 3 | Technical feasibility | CESC | 3 |
| 4 | Issue of Work Award | CESC | 30 |
| 5 | Survey of site and submission of DPR | Service Provider | 10 |
| 6 | Issue of approval letter by sub-divisional officer | CESC | 7 |
| 7 | Execution of Agreement | Consumer, Service Provider & CESC  and  Consumer & CESC | 15-20 |
| 8 | Installation of Rooftop Solar System including meters | CESC, Service Provider & Consumer | 90-180 days |
| 9 | Work Completion Report | Consumer & Service Provider | 90-180 days  (from Letter of Award)  (depending upon capacity) |
| 10 | Inspection by CEIG (if applicable) | CEIG | 15-20 |
| 11 | Inspection and Commissioning of the System | CESC | 15-20 (after CEIG approval)  (CEIG is exempted for capacity upto 1 MW) |
| 12 | Submission for Release of CFA | CESC | 15 |

1. **Duration of Empanelment:**

The Empaneled Vendor shall complete the design, engineering, manufacture, supply, storage, civil work, erection, testing & commissioning of each project within 180 days from the date of issue of the Work approval Letter by CESC or upto 24 Months from Date of MNRE Sanction i.e. 24 months from 19.01.2022 whichever is earlier.

1. **Payment Procedure:**

**CESC, through its online portal will provide option to its Consumers to select any agency among the list of CESC empaneled vendors for installation of Solar Rooftop plants on their rooftops.**

The Consumer/beneficiary will pay the SRTPV installation cost directly to the empaneled vendor.

The proportion of admissible CFA shall be disbursed by MNRE to the consumer directly after successful commissioning of the project as per MNRE Operational Guidelines issued vide OM No. 318/ 6/2022- Grid Connected Rooftop Dated 02.02.2022 and their amendments.

**MNRE Benchmark Cost:**

The Ministry of New and Renewable Energy (MNRE), Government of India vide OM No. 32/24/2020-SPV Division dated 27.10.2021 has notified the Benchmark cost for Rooftop Solar Plants for FY 2021-22 as under:

| Sl. No. | Capacity Range\* | Benchmark Cost *(INR/KWp)* ***excluding GST*** |
| --- | --- | --- |
| **General Category States /UTs** |
| 1. | 1 kWp | 46923 |
| 2. | 2 kWp | 43140 |
| 3. | 3 kWp | 42020 |
| 4. | Above 3-10 kWp | 40991 |
| 5. | Above 10-100 kWp | 38236 |
| 6. | Above 100-500 kWp | 35886 |

**The CFA shall be released by MNRE to the consumer, only after receipt of the same from MNRE.** The empaneled vendor shall submit the following documents for release of CFA.

* + 1. Joint Commissioning Report (JCR)
    2. Claim Letter
    3. Guarantee certificate on Letter Head of the Vendor.
    4. Geo-coordinates and photos of the sit

1. **Proposed Work flow:**

* **Application Registration by Consumer**
* **Consent from the consumer for the scheme**
* **Selection of EPC Contractor for the newly registered consumer**
* **Technical Feasibility by sub-divisional officer, CESC**
* **Survey of the rooftop of the consumers by the EPC Contractor**
* **Payment of Facilitation fees by consumer on intimation by CESC**
* **Display of total cost of the SRTPV plant, consumer investment portion and subsidy from MNRE, GoI.**
* **Selection of EPC contractor by consumer who have already registered.**
* **Message to EPC Contractor & approval by DSM Section (To monitor the work progress)**
* **Intimation (Message) to execute PPA by CESC to the consumer**
* **Uploading Power Purchase Agreement executed b/w Consumer & CESC**
* **Intimation (Message) to the consumer to start the work of SRTPV** **installation**
* **Uploading EPC agreement between consumer and EPC contractor**
* **Installation of SRTPV plant by EPC Contractor**
* **Uploading Work Completion Report by the consumer**
* **Uploading Joint Inspection Report by Consumer, CESC & EPC**
* Uploading Synchronizing & Commissioning Report by the sub-divisional officer, CESC
* Submission of PCR by CESC to MNRE, GoI

1. **Documents to be submitted by agencies/vendors under Simplification of Procedure:**
2. Company /Firm Registration Certificate.
3. Address Proof and ID proof
4. PAN Card
5. GST Certificate
6. Performance Bank Guarantee of 2.5 Lakhs valid for a period of 5 years.

**Technical Specifications to be adopted for installation of Solar Rooftop Plants under Soura Gruha Yojane.**

The proposed projects shall be commissioned as per the technical specifications given below. Any shortcomings will lead to cancelation of CFA in full or part as decided BESOM. Domestic Modules are to be used failing which it will be assumed that system is not matching the requirement of the scheme and bidder’s PBG shall be forfeited. Competent Authority’s decision will be final and binding on the bidder.

**1. DEFINITION**

A Roof Top Solar (RTS) Photo Voltaic (PV) system shall consist of following equipment/components:

1. Solar Photo Voltaic (SPV) modules consisting of required number of Crystalline PV modules
2. Inverter/PCU
3. Module Mounting structures
4. Energy Meter
5. Array Junction Boxes
6. DC Distribution Box
7. AC Distribution Box
8. Protections – Earthing, Lightning, Surge
9. Cables
10. Drawing & Manuals
11. Miscellaneous
12. **Solar PV modules** 
    1. The PV modules and Solar Cell used should be made in India.
    2. The PV modules used must qualify to the latest edition of IEC standards or equivalent BIS standards, i.e. IEC 61215/IS14286, IEC 61853-Part I/IS 16170-Part I, IEC 61730 Part-1 & Part 2 and IEC 62804 (PID). For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701/IS 61701.
    3. The rated power of solar PV module shall have maximum tolerance up to +3%.
    4. The peak-power point current of any supplied module string (series connected modules) shall not vary by +1% from the respective arithmetic means for all modules and/or for all module strings (connected to the same MPPT), as the case may be.
    5. The peak-power point voltage of any supplied module string (series connected modules) shall not vary by + 2% from the respective arithmetic means for all modules and/or for all module strings (connected to the same MPPT), as the case may be.
    6. The temperature co-efficient power of the PV module shall be equal to or better than -0.45%/°C.
    7. Solar PV modules of minimum capacity 250 Wp to be used.
    8. The PV Module efficiency should be minimum 16%.
    9. Solar PV modules of minimum fill factor 75%, to be used.
    10. All electrical parameters at STC shall have to be provided
    11. The PV modules shall be equipped with IP 65 or better protection level junction box with required numbers of bypass diodes of appropriate rating and appropriately sized output power cable of symmetric length with MC4 or equivalent solar connectors. The IP level for protection may be chosen based on following conditions:
13. An [IP 65 rated enclosure](https://www.polycase.com/ip65-enclosures) is suitable for most outdoor enclosures that won’t encounter extreme weather such as flooding.
14. An [IP 67 rated enclosure](https://www.polycase.com/ip67-enclosures) is suitable at locations which may encounter temporary submersion at depths of up to one meter.
15. An [IP 68 enclosure](https://www.polycase.com/ip68-enclosures) is recommended if there may exist situations of submergence for extended periods of time and at substantial depths.
    1. All PV modules should carry a performance warranty of >90% during the first 10 years, and >80% during the next 15 years. Further, module shall have performance warranty of >97% during the first year of installation—degradation of the module below 1 % per annum.
    2. The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (05) years from the date of commissioning:
    3. Defects and/or failures due to manufacturing.
    4. Defects and/or failures due to quality of materials.
    5. Nonconformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owners sole option.
    6. PV modules must be tested and approved by one of the NABL accredited and BIS approved test centers.
    7. Modules deployed must use a RF identification tag laminated inside the glass. The following information must be mentioned in the RFID used on each module:
16. Name of the manufacturer of the PV module
17. Name of the manufacturer of Solar Cells.
18. Month & year of the manufacture (separate for solar cells and modules)
19. Country of origin (separately for solar cells and module)
20. I-V curve for the module Wattage, Im, Vm and FF for the module
21. Unique Serial No and Model No of the module
22. Date and year of obtaining IEC PV module qualification certificate.
23. Name of the test lab issuing IEC certificate.
24. Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001.
25. Nominal wattage +3%.
26. Brand Name, if applicable.
    1. Other details as per IS/IEC 61730-1 clause 11 should be provided at appropriate place. In addition to the above, the following information should also be provided:
27. The actual Power Output Pmax shall be mentioned on the label pasted on the back side of PV Module.
28. The Maximum system voltage for which the module is suitable to be provided on the back sheet of the module.
29. Polarity of terminals or leads (colour coding is permissible) on junction Box housing near cable entry or cable and connector.
    1. Unique Serial No, Model No, Name of Manufacturer, Manufacturing year, Make in India logo and module wattage details should be displayed inside the laminated glass.
30. **Inverter/PCU**

The successful bidders must procure the required capacity and quantity of Inverters under the project from CESC empanelled inverter manufacturers only. The list of the CESC empanelled vendors is available at CESC website. Bidders are advised to go through the list of empanelled vendors published in the CESC website at [https://CESC.karnataka.gov.in/new-page/EMPANELMENT/en](https://bescom.karnataka.gov.in/new-page/EMPANELMENT/en)

* 1. The Inverter should have a provision of remote monitoring of inverter data through sim card. Required website/mobile app platform, where the user (Consumer) can access the data, should be provided/explained to consumer while installation. Additionally, if inverter has the facility of in-built wi-fi module, that should also be explained to the consumer. On demand, Inverter should also have provision to feed the data to the remote monitoring server using relevant API/ protocols. All the inverter data should be available for monitoring by giving web access.
  2. For CFA calculation, minimum of following two shall be considered:

1. Solar PV array capacity in KWp
2. Inverter Capacity in KW

1. **Module Mounting Structure (MMS):** 
   1. Supply, installation, erection and acceptance of module mounting structure (MMS) with all necessary accessories, auxiliaries and spare part shall be in the scope of the work.
   2. Module mounting structures can be made from three types of materials. They are Hot Dip Galvanized Iron, Aluminium and Hot Dip Galvanized Mild Steel (MS). However, MS will be preferred for raised structure.
   3. MMS Steel shall be as per latest IS 2062:2011 and galvanization of the mounting structure shall be in compliance of latest IS 4759. MMS Aluminium shall be as per AA6063 T6. For Aluminium structures, necessary protection towards rusting need to be provided either by coating or anodization.
   4. All bolts, nuts, fasteners shall be of stainless steel of grade SS 304 or hot dip galvanized, panel mounting clamps shall be of aluminium and must sustain the adverse climatic conditions. Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts.
   5. The module mounting structures should have angle of inclination as per the site conditions to take maximum insolation and complete shadow-free operation during generation hours. However, to accommodate more capacity the angle of inclination may be reduced until the plant meets the specified performance ratio requirements.
   6. The Mounting structure shall be so designed to withstand the speed for the wind zone of the location where a PV system is proposed to be installed. The PV array structure design shall be appropriate with a factor of safety of minimum 1.5. The upper edge of the module must be covered with wind shield so as to avoid build air ingress below the module. Slight clearance must be provided on both edges (upper & lower) to allow air for cooling.
   7. Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed. The Empanelled Agency shall be fully responsible for any damages to SPV System caused due to high wind velocity within guarantee period as per technical specification.
   8. The structures shall be designed to allow easy replacement, repairing and cleaning of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels. Necessary testing provision for MMS to be made available at site.
   9. Adequate spacing shall be provided between two panel frames and rows of panels to facilitate personnel protection, ease of installation, replacement, cleaning of panels and electrical maintenance.
   10. The structure shall be designed to withstand operating environmental conditions for a period of minimum 25 years.
   11. The Rooftop Structures maybe classified in three broad categories as follows (drawings at **Annexure-X**):
       1. **Ballast structure**
2. The mounting structure must be Non-invasive ballast type and any sort of penetration of roof to be avoided.
3. The minimum clearance of the structure from the roof level should be in between 70-150 mm to allow ventilation for cooling, also ease of cleaning and maintenance of panels as well as cleaning of terrace.
4. The structures should be suitably loaded with reinforced concrete blocks of appropriate weight made out of M25 concrete mixture.
   * 1. **Tin shed**
5. The structure design should be as per the slope of the tin shed.
6. The inclination angle of structure can be done in two ways-

b.1. Parallel to the tin shed (flat keeping zero-degree tiling angle), if the slope of shed in Proper south direction

b.2. With same tilt angle based on the slope of tin shed to get the maximum output.

1. The minimum clearance of the lowest point from the tin shade should be more then 100mm.
2. The base of structure should be connected on the Purlin of tin shed with the proper riveting.
3. All structure member should be of minimum 2 mm thickness.
   * 1. **RCC Elevated structure:** It can be divided into further three categories:
4. **Minimum Ground clearance (300MM – 1000 MM)**
5. The structure shall be designed to allow easy replacement of any module and shall be in line with site requirement. The gap between module should be minimum 30MM.
6. Base Plate – Base plate thickness of the Structure should be 5MM for this segment.
7. Column – Structure Column should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
8. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 70MM in Web side (y-axis) and 40MM in flange side (x-axis).
9. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 60MM in Web side and 40MM in flange side in Lip section.
10. Front/back bracing – The section for bracing part should be minimum 2MM thickness.
11. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.
12. For single portrait structure the minimum ground clearance should be 500MM.
13. **Medium Ground clearance (1000MM – 2000 MM)**
14. Base Plate – Base plate thickness of the Structure should be Minimum 6MM for this segment.
15. Column – Structure Column should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.
16. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
17. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
18. Front/back bracing – The section for bracing part should be minimum 2MM thickness.
19. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.
20. **Maximum Ground clearance (2000MM – 3000 MM)**
21. Base Plate – Base plate thickness of the Structure should be minimum 8 MM for this segment.
22. Column – Structure Column thickness should be minimum 2.6MM in square hollow section (minimum 50x50) or rectangular hollow section (minimum 60x40) or 3MM in C-Channel section.
23. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.
24. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.
25. Front/back bracing – The section for bracing part should be minimum 3MM thickness.
26. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.
27. **Super elevated structure (More than 3000 MM)**

D.1. Base structure

1. Base Plate – Base plate thickness of the Structure should be 10MM for this segment.
2. Column – Structure Column minimum thickness should be minimum 2.9MM in square hollow section (minimum 60x60) or rectangular hollow section (minimum 80x40).
3. Rafter - Structure Rafter minimum thickness should be minimum 2.9MM in square hollow section (minimum 60x60) or rectangular hollow section (minimum 80x40).
4. Cross bracing – Bracing for the connection of rafter and column should be of minimum thickness of 4mm L-angle with the help of minimum bolt diameter of 10mm.

D.2. Upper structure of super elevated structure –

1. Base Plate – Base plate thickness of the Structure should be minimum 5MM for this segment.
2. Column – Structure Column should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
3. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
4. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 60MM in Web side and 40MM in flange side in Lip section.
5. Front/back bracing – The section for bracing part should be minimum 2MM thickness.
6. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

D.3. If distance between two legs in X-Direction is more than 3M than sag angle/Bar should be provide for purlin to avoid deflection failure. The sag angle should be minimum 2MM thick, and bar should be minimum 12Dia.

D.4. Degree - The Module alignment and tilt angle shell be calculated to provide the maximum annual energy output. This shall be decided on the location of array installation.

D.5. Foundation – Foundation should be as per the roof condition; two types of the foundation can be done- either penetrating the roof or without penetrating the roof.

1. If penetration on the roof is allowed (based on the client requirement) then minimum 12MM diameter anchor fasteners with minimum length 100MM can be use with proper chipping. The minimum RCC size should be 400x400x300 cubic mm. Material grade of foundation should be minimum M20.
2. If penetration on roof is not allowed, then foundation can be done with the help of ‘J Bolt’ (refer IS 5624 for foundation hardware). Proper Neto bond solution should be used to adhere the Foundation block with the RCC roof. Foundation J - bolt length should be minimum 12MM diameter and length should be minimum 300MM.
   1. **Material standards:**
      1. Design of foundation for mounting the structure should be as per defined standards which clearly states the Load Bearing Capacity & other relevant parameters for foundation design (As per IS 6403 / 456 / 4091 / 875).
      2. Grade of raw material to be used for mounting the structures so that it complies the defined wind loading conditions (As per IS 875 - III) should be referred as follows (IS 2062 – for angles and channels, IS 1079 – for sheet, IS 1161 & 1239 for round pipes, IS 4923 for rectangular and square hollow section)
      3. Test reports for the raw material should be as per IS 1852 / 808 / 2062 / 1079 / 811.
      4. In process inspection report as per approved drawing & tolerance should be as per IS 7215.
      5. For ascertaining proper welding of structure part following should be referred:
3. D.P. Test (Pin Hole / Crack) (IS 822)
4. Weld wire grade should be of grade (ER 70 S - 6)
   * 1. For ascertaining hot dip galvanizing of fabricated structure following should be referred: -
5. Min coating required should be as per IS 4759 & EN 1461.
6. Testing of galvanized material
   * + Pierce Test (IS 2633)
     + Mass of Zinc (IS 6745)
     + Adhesion Test (IS 2629)
     + CuSO4 Test (IS 2633)
     + Superior High-Grade Zinc Ingot should be of 99.999% purity (IS 209) (Preferably Hindustan Zinc Limited or Equivalent).
     1. Foundation Hardware – If using foundation bolt in foundation then it should be as per IS 5624.
   1. Design Validation- The Structure design and drawing should be duly verified by a licensed Structural designer before installation for all types of structure arrangements including the extension made, as per specification.
7. **Metering**
   1. A Roof Top Solar (RTS) Photo Voltaic (PV) system shall consist of following energy meters:
8. Net meter: To record import and export units
9. Generation meter: To keep record for total generation of the plant.
   1. The installation of meters including CTs & PTs, wherever applicable, shall be carried out by the Empanelled Vendor as per the terms, conditions and procedures laid down by the concerned SERC/DISCOMs.
10. **Array Junction Boxes:** 
    1. The junction boxes are to be provided in the PV array for termination of connecting cables. The Junction Boxes (JBs) shall be made of GRP/FRP/Powder Coated aluminum /cast aluminum alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JBs shall be such that input & output termination can be made through suitable cable glands. Suitable markings shall be provided on the bus-bars for easy identification and cable ferrules will be fitted at the cable termination points for identification.
    2. Copper bus bars/terminal blocks housed in the junction box with suitable termination threads Conforming to IP 65 or better standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry, Single /double compression cable glands should be provided.
    3. Polyamide glands and MC4 Connectors may also be provided. The rating of the junction box shall be suitable with adequate safety factor to interconnect the Solar PV array.
    4. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification.
    5. Junction boxes shall be mounted on the MMS such that they are easily accessible and are protected from direct sunlight and harsh weather.
11. **DC Distribution Box (DCDB):** 
    1. May not be required for small plants, if suitable arrangement is available in the inverter.
    2. DC Distribution Box are to be provided to receive the DC output from the PV array field.
    3. DCDBs shall be dust & vermin proof conform having IP 65 or better protection, as per site conditions.
    4. The bus bars are made of EC grade copper of required size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the inverter along with necessary surge arrestors. MCB shall be used for currents up to 63 Amperes, and MCCB shall be used for currents greater than 63 Amperes.
12. **AC Distribution Box (ACDB):** 
    1. AC Distribution Panel Board (DPB) shall control the AC power from inverter, and should have necessary surge arrestors, if required. There is interconnection from ACDB to mains at LT Bus bar while in grid tied mode.
    2. All switches and the circuit breakers, connectors should conform to IEC 60947:2019, part I, II and III/ IS 60947 part I, II and III.
    3. The isolators, cabling work should be undertaken as part of the project.
    4. All the Panel’s shall be metal clad, totally enclosed, rigid, floor mounted, air -insulated, cubical type suitable for operation on *1-ϕ*/*3-ϕ*, 415 or 230 volts, 50 Hz (or voltage levels as per CEA/State regulations).
    5. The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.
    6. All indoor panels will have protection of IP 54 or better, as per site conditions. All outdoor panels will have protection of IP 65 or better, as per site conditions.
    7. Should conform to Indian Electricity Act and CEA safety regulations (till last amendment).
    8. All the 415 or 230 volts (or voltage levels as per CEA/State regulations) AC devices / equipment like bus support insulators, circuit breakers, SPDs, Voltage Transformers (VTs) etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions.
13. Variation in supply voltage: as per CEA/State regulations
14. Variation in supply frequency: as per CEA/State regulations
    1. The inverter output shall have the necessary rated AC surge arrestors, if required and MCB/ MCCB. RCCB shall be used for successful operation of the PV system, if inverter does not have required earth fault/residual current protection.
15. **Protections**

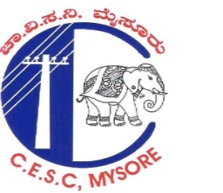
The system should be provided with all necessary protections like earthing, Lightning, and Surge Protection, as described below:

* 1. **Earthing Protection**

1. The earthing shall be done in accordance with latest Standards.
2. Each array structure of the PV yard, Low Tension (LT) power system, earthing grid for switchyard, all electrical equipment, inverter, all junction boxes, etc. shall be grounded properly as per IS 3043-2018.
3. All metal casing/ shielding of the plant shall be thoroughly grounded in accordance with CEA Safety Regulation 2010. In addition, the lightning arrester/masts should also be earthed inside the array field.
4. Earth resistance should be as low as possible and shall never be higher than 5 ohms.
5. For 10 KW and above systems, separate three earth pits shall be provided for individual three earthings viz.: DC side earthing, AC side Earthing and Lightning arrestor earthing.
   1. **Lightning Protection**
6. The SPV power plants shall be provided with lightning & over voltage protection, if required. The main aim in this protection shall be to reduce the overvoltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc.
7. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors (LAs). Lightning protection should be provided as per NFC17-102:2011/IEC 62305 standard.
8. The protection against induced high-voltages shall be provided by the use of Metal Oxide Varistors (MOVs)/Franklin Rod type LA/Early streamer type LA.
9. The current carrying cable from lightning arrestor to the earth pit should have sufficient current carrying capacity according to IEC 62305. According to standard, the minimum requirement for a lightning protection system designed for class of LPS III is a 6 mm2 copper/ 16 mm2 aluminum or GI strip bearing size 25\*3 mm thick). Separate pipe for running earth wires of Lightning Arrestor shall be used.
   1. **Surge Protection**
10. Internal surge protection, wherever required, shall be provided.
11. It will consist of three SPD type-II/MOV type surge arrestors connected from +ve and –ve terminals to earth.
12. **CABLES** 
    1. All cables should conform to latest edition of IEC/equivalent BIS Standards alongwith IEC 60227/IS 694, IEC 60502/IS 1554 standards.
    2. Cables should be flexible and should have good resistance to heat, cold, water, oil, abrasion etc.
    3. Armored cable should be used and overall PVC type ‘A’ pressure extruded insulation or XLPE insulation should be there for UV protection.
    4. Cables should have Multi Strand, annealed high conductivity copper conductor on DC side and copper/FRLS type Aluminum conductor on AC side. For DC cabling, multi-core cables shall not be used.
    5. Cables should have operating temperature range of -10°C to +80°C and voltage rating of 660/1000 V.
    6. Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop less than 2% (DC Cable losses).
    7. The size of each type of AC cable selected shall be based on minimum voltage drop. However; the maximum drop shall be limited to 2%.
    8. The electric cables for DC systems for rated voltage of 1500 V shall conform to BIS 17293:2020.
    9. All cable/wires are to be routed in a RPVC pipe/ GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable is easily identified.
    10. All cable trays including covers to be provided.
    11. Thermo-plastic clamps to be used to clamp the cables and conduits, at intervals not exceeding 50 cm.
    12. Size of neutral wire shall be equal to the size of phase wires, in a three phase system.
    13. The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e. 25 years.
13. **DRAWINGS & MANUALS:** 
    1. Operation & Maintenance manual/user manual, Engineering and Electrical Drawings shall be supplied along with the power plant.
    2. The manual shall include complete system details such as array lay out, schematic of the system, inverter details, working principle etc.
    3. The Manual should also include all the Dos & Don’ts of Power Plant along with Graphical Representation with indication of proper methodology for cleaning, Operation and Maintenance etc.
    4. Step by step maintenance and troubleshooting procedures shall also be given in the manuals.
    5. Vendors should also educate the consumers during their AMC period.
14. **Miscellaneous:**
    1. Connectivity: The maximum capacity for interconnection with the grid at a specific voltage level shall be as specified in the SERC regulation for Grid connectivity and norms of DISCOM and amended from time to time.
    2. Safety measures: Electrical safety of the installation(s) including connectivity with the grid must be taken into account and all the safety rules & regulations applicable as per Electricity Act, 2003 and CEA Safety Regulation 2010 etc. must be followed.
    3. Shadow analysis: The shadow analysis report with the instrument such as Solar Pathfinder or professional shadow analysis software of each site should be provided and the consumer should be educated to install the system only in shadow free space. Lower performance of the system due to shadow effect shall be liable for penalty for lower performance.
    4. Firefighting system - Portable fire extinguishers/sand buckets shall be provided wherever required as per norms.

**Quality Certification, Standards and Testing for Grid-Connected Rooftop Solar PV Systems/Power Plants**

|  |  |
| --- | --- |
| **Solar PV Modules/Panels** | |
| IEC 61215 and  IS 14286 | Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules |
| IEC 61701:2011 | Salt Mist Corrosion Testing of Photovoltaic (PV) Modules |
| IEC 61853- 1:2011 /  IS 16170-1:2014 | Photovoltaic (PV) module performance testing and energy rating –: Irradiance and temperature performance measurements, and power Rating. |
| IEC 62716 | Photovoltaic (PV) Modules – Ammonia (NH3) Corrosion Testing (as per the site condition like dairies, toilets etc) |
|  |
| IEC 61730-1,2 | Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements for Construction, Part 2: Requirements for Testing |
| IEC 62804 | Photovoltaic (PV) modules – Test method for detection of potential-induced degradation. IEC 62804-1: Part 1: Crystalline Silicon |
| **Solar PV Inverters** | |
| IEC 62109 or  IS : 16221 | Safety of power converters for use in photovoltaic power systems – Part 1: General requirements, and Safety of power converters for use in photovoltaic power systems  Part 2: Particular requirements for inverters. Safety compliance (Protection degree IP 65 or better for outdoor mounting, IP 54 or better for indoor mounting) |
| IS/IEC 61683 latest | Photovoltaic Systems – Power conditioners: Procedure for Measuring Efficiency (10%, 25%, 50%, 75% & 90-100% Loading Conditions) |
| (as applicable) |
| IEC 60068-2 /IEC 62093  (as applicable) | Environmental Testing of PV System – Power Conditioners and Inverters |
| IEC 62116:2014/ IS16169 | Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures |
| **Fuses** | |
| IS/IEC 60947 (Part  1, 2 & 3), EN 50521 | General safety requirements for connectors, switches, circuit breakers (AC/DC):  1)Low-voltage Switchgear and Control-gear, Part 1: General rules  2)Low-Voltage Switchgear and Control-gear, Part 2: Circuit Breakers  3)Low-voltage switchgear and Control-gear, Part 3: Switches, disconnectors switch-disconnectors and fuse-combination units  4) EN 50521: Connectors for photovoltaic system-Safety requirements and tests |
| IEC 60269-6:2010 | Low-voltage fuses - Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems |
| **Solar PV Roof Mounting Structure** | |
| IS 2062/IS 4759/AA6063 T6 | Material for the structure mounting |
| **Surge Arrestors** | |
| BFC 17-102:2011/ NFC 102:2011/ IEC 62305 | Lightening Protection Standard |
| IEC 60364-5-53/ IS 15086-5 (SPD)  IEC 61643- 11:2011 | Electrical installations of buildings - Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control  Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods |
| **Cables** | |
| IEC 60227/IS 694, IEC 60502/IS 1554 (Part 1 & 2)/ IEC69947 (as applicable) | General test and measuring method for PVC (Polyvinyl chloride) insulated cables (for working voltages up to and including 1100 V, and UV resistant for outdoor installation) |
| BS EN 50618 | Electric cables for photovoltaic systems (BT(DE/NOT)258), mainly for DC Cables |
| **Earthing /Lightning** | |
| IEC 62561/IEC 60634 Series (Chemical earthing)  (as applicable) | IEC 62561-1: Lightning protection system components (LPSC) - Part: Requirements for connection components  IEC 62561-2: Lightning protection system components (LPSC) – Part 2: Requirements for conductors and earth electrodes  IEC 62561-7: Lightning protection system components (LPSC) - Part 7: Requirements for earthing enhancing compounds |
| **Junction Boxes** | |
| IEC 60529 | Junction boxes and solar panel terminal boxes shall be of the thermo- plastic type with IP 65 or better protection for outdoor use, and IP 54 or better protection for indoor use |

**ಚಾಮುಂಡೇಶ್ವರಿ ವಿದ್ಯುತ್‌ ಸರಬರಾಜು ನಿಗಮ ನಿಯಮಿತ**

**CHAMUNDESHWARI ELECTRICITY SUPPLY COMPANY LIMITED**

**Application for Empanelment under Simplification of Procedure**

1. Name of the Firm with Address: ---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
2. Firm Registration No. & date: ------------------------------------------
3. Place of Registration:------------------------
4. GST Registration No:-------------------
5. PAN Card No:--------------------
6. Name and Designation of the Contact Person:---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
7. Contact Details : Phone No:-------------------------------------------------------------------------------------------------------------------------------------- email id:-----------------------------------------------------------------
8. Balance Sheet for FY 2019-20 & FY 2020-21 (Enclosed)-----------YES/NO
9. Capacity proposed for installation under the scheme:

| **LOT** | **Please enter capacity in kW you intend to execute under the scheme** | | | | **Total in kW** |
| --- | --- | --- | --- | --- | --- |
| **Part A** | **Part B** | **Part C** | **Part D** |
| LOT-1 |  |  |  |  |  |
| LOT-2 |  |  |  |  |  |
| LOT-3 |  |  |  |  |  |
| Total |  |  |  |  |  |

Note: Please note that minimum capacity is 20kW and maximum capacity is 100kW under simplification of Procedure.

**Declaration:**

I/We --------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------- hereby declare that information furnished above is true and correct to the best of our knowledge.

I/We agree to abide by the following conditions of empanelment:

1. I/We agree to submit the Performance Bank Guarantee of value Rs 2.5 Lakhs valid upto 5 years
2. I/We agree to execute the work as per KERC SRTPV Regulations 2016 and MNRE Guidelines for implementation of Phase-II of Grid Connected Rooftop Solar Program.

Signature with seal