

ग्रामपंचायत एकंबे ता. कोरेगाव जि. सातारा

ई-निविदा सुचना क्र. १

मौजे एकंबे येथे १० कि. वॅ. क्षमतेचा सौरपंप बसवणेबाबत...

सरपंच ग्रामपंचायत एकंबे ता. कोरेगाव जि. सातारा मौजे एकंबे येथे १४ वित्त आयोग अंतर्गत मौजे एकंबे येथे ५ एच.पी. क्षमतेचा सौरपंप बसवणेबाबत ई-निविदा दोन लिफाफा पद्धतीने मागविण्यात येत आहे.

अ.नं.	वस्तूचे नाव	नग	निविदा विक्री रक्कम	बयाना/इसारा रक्कम
१	मौजे एकंबे ता. कोरेगाव येथील पाणी पुरवठा विहिरीकरिता १० कि. वॅ. क्षमतेचा पारेषण संलग्न सौर विद्युत प्रकल्प आस्थापित करणेबाबत...	आवश्यकतेनुसार घेण्यात येतील.	२००/-	४,७८०/-

निविदेच्या अटी व शर्ती

- वरील साहित्य खरेदी निविदा प्रक्रिया ई-निविदा प्रक्रियेद्वारे <https://mahatenders.gov.in> या संकेत स्थळावर ऑनलाईन करण्यात येईल तसेच या निविदेबाबत सर्व सूचना शुद्धीपत्रके इ. या संकेतस्थळावर ऑनलाईन प्रसिद्ध केली जातील.
- पुरवण्यात येणाऱ्या सर्व साहित्यांची रॉयल्टी, विक्रीकर, आयकर व शासनाने इतर उपकर व फी भरावयाची जबाबदारी पुरवठा धारकाची राहिल व त्यातील कोणत्याही नियमाचा भंग झाल्यास दंड वा शिक्षेस पुरवठाधारक स्वतः जबाबदार राहिल त्यामुळे BOQ मध्ये साहित्याचे दर सर्व करासहित विचार करून नोंदवावे.
- मंजूर निविदेतील साहित्यांचे दर निविदा मंजूर दिनांकापासून १२० दिवसापर्यंत लागू राहतील. बाजारपेठेत सदर साहित्यांचे दर वाढल्यास वाढीव दराची रक्कम ग्रामपंचायत देणार नाही.
- निविदा मंजूर झाल्यास पुरवठाधारकास आदेशपत्र देण्यापूर्वी रुपये ५००/- च्या स्टॅम्प पेपरवर विहित नमुन्यात करारनामा करून देणे बंधनकारक राहिल.
- पुरवठाधारकाने पुरविलेल्या साहित्यांचे देयके निधीचे उपलब्धतेनुसार अदा करण्यात येतील मात्र कोणत्याही प्रकारचे अग्रिम दिले जाणार नाही.
- एकच अथवा सर्वच निविदा कारणे न देता अंशतः / संपुर्ण नाकारणेचा अधिकार सरपंच / ग्रामसेवक ग्रा. पं. एकंबे ता. कोरेगाव यांना राखून ठेवला आहे. त्याप्रमाणे निविदा का नाकारली याचा खुलासा देखील मागता येणार नाही.
- निविदा उघडण्यापूर्वी साहित्याचा एक नमुना पुरवण्याचा आहे. दरपत्रकात नमूद केलेल्या त्या साहित्याच्या तपशीलप्रमाणे नमुना देणे बंधनकारक राहिल. नमुना न पुरविल्यास निविदा रद्द करण्याचा अधिकार ग्रामपंचायतीस असतील. तसेच निविदा मंजुरीनंतर नमुन्याप्रमाणे साहित्य पुरवठा केला नाही तर दिलेले आदेश रद्द करण्यात येतील याबाबत संबंधिताची कोणतीच तक्रार विचारात घेतली जाणार नाही. नमुन्याप्रमाणे साहित्य न पुरविल्यास सदर पुरवठाधारकाची रक्कम देण्यास ग्रामपंचायत जबाबदार राहणार नाही. तसेच गरजेप्रमाणे साहित्य कमी किंवा जादा प्रमाणात खरेदी केले जाईल.
- निविदेला मंजुरी मिळाल्यानंतर मालाचा पुरवठा करणेपूर्वी तयार असणारे साहित्य पुरवठादाराने कार्यालय सांगेल त्या दिवशी व त्याठिकाणी दाखविण्यास ठेवले पाहिजे व ते नमुन्याप्रमाणे असल्याची खात्री झाल्यावर मालाचा पुरवठा आदेश मिळाल्यावर दिलेल्या कालावधीत कामाचा ठिकाणी स्वखर्चाने पोहोच केले पाहिजे. ग्रामपंचायत कार्यालयाचे प्रतिनिधी साहित्याची तपासणी करतील व त्यावेळी पुरवठादाराने निकृष्ट प्रतीच्या साहित्याचा पुरवठा केला असेल तर ते साहित्य ग्रामपंचायत स्वीकारणार नाही व यामध्ये पुरवठाधारकाचे नुकसानीस ग्रामपंचायत जबाबदार राहणार नाही. यानंतर साहित्य खरेदीस नवीन निविदा प्रसिद्ध केली जाईल. मुदतीत साहित्य पुरवठा न केल्यास प्रति दिन रु. ५००/- दंडाची आकारणी केली जाईल. विलंबाने साहित्य पुरवठा केल्यास दंडाची रक्कम बिलातुन वजा केली जाईल.
- निविदेबाबत काही वाद निर्माण झाल्यास त्याबाबत ग्रामपंचायत एकंबे ता. कोरेगाव जो निर्णय घेईल तो निविदा धारकास बंधनकारक राहिल तसेच कोणतीही निविदा मंजूर करणे अथवा नाकारणे याचे सर्व अधिकार ग्रामपंचायत एकंबे ता. कोरेगाव यांनी राखून ठेवले आहेत.
- निविदेसोबत जोडलेल्या कागदपत्रांचे सादरीकरण करणे बंधनकारक राहिल.

११. निविदा भरतेवेळी निविदा धारकाने ग्रामपंचायतमध्ये संपर्क साधून कोणत्या ठिकाणी काम करायचे आहे याची माहिती घ्यावी कारण काम मिळाल्यानंतर कोणत्याही प्रकारच्या अडचणी मान्य करून घेतल्या जाणार नाहीत. निविदा भरताना ग्रामपंचायत यांच्याकडून माहिती घेतली असलेबाबत चे ग्रामपंचायत पत्र तांत्रिक कागदपत्रे यात जोडणे बंधनकारक आहे, अथवा आपली निविदा नाकारली जाऊ शकते. एखाद्या पुरवठादाराकडून पुरवठा मालामध्ये त्रुटी आढळल्यास योग्य ती कायदेशीर कारवाई करण्याचे संपूर्ण अधिकार ग्रामपंचायतीस राहतील.

१२. साहित्य बसविल्यापासून पुढील ५ वर्षे देखभाल ही जागेवर येऊन द्यावी लागेल.

ईनिविदा फॉर्म उपलब्ध दि. ०३/०३/२०२२ ते १०/०३/२०२२ सायंकाळी ०४.०० वाजेपर्यंत.

ईनिविदा स्वीकृतीची अंतिम दि. १०/०३/२०२२ सायंकाळी ०४.०० वाजेपर्यंत.

तांत्रिक लिफाफा क्र.१ उघडण्याची दि. ११/०३/२०२२ व वित्तीय लिफाफा क्र.२ उघडण्याची दि. ११/०३/२०२२ (शक्य झाल्यास).

लिफाफा क्र. १ मध्ये स्कॅन करून अपलोड करावयाची कागदपत्रे

- “ग्रामविकास अधिकारी ग्रामपंचायत एंक्वे” यांच्या नावे SBI ONLINE द्वारे निविदा फॉर्म फी रु. २००/- भरलेबाबतच्या प्रमाणपत्राची युनिक ट्रान्झेक्शन रजिस्ट्रेशन क्रमांक (UTR) नोंदवून स्कॅन कॉपी अपलोड करावी.
- “ग्रामविकास अधिकारी ग्रामपंचायत एंक्वे” यांच्या नावे SBI ONLINE द्वारे बयाना/ इसारा रक्कम रु. ४७८०/- भरलेबाबतच्या प्रमाणपत्राची युनिक ट्रान्झेक्शन रजिस्ट्रेशन क्रमांक (UTR) नोंदवून स्कॅन कॉपी अपलोड करावी.
- मागील ३ वर्षांचे आयकर प्रमाणपत्र स्कॅन कॉपी.
- पॅन कार्ड स्कॅन कॉपी.
- जी एस टी नोंदणी प्रमाणपत्राची स्कॅन कॉपी.
- शॉप अॅक्ट/ व्यवसाय ना हरकत दाखला रजिस्ट्रेशन प्रमाणपत्राची स्कॅन कॉपी.
- डीस्ट्रीब्यूटर सर्तीफीकेट अथवा मास्टर डीलर सर्तीफीकेट अथवा अधिकृत उसादक असलेचे प्रमाणपत्र.
- पुरवठा करणेत येणार साहित्य हे स्पेशिफिकेशनप्रमाणे असल्याचा तत्सम यंत्रणेचा तपासणी अहवाल/ टेस्ट रिपोर्ट.
- निविदाधारकाने कार्यालयीन सोयीसाठी ई-निविदा भरतेवेळी स्वतः चा अभिकृत पत्ता, दूरध्वनी संपर्क क्रमांक, ई-मेल आयडी. नोंदविणे आवश्यक आहे.
- अश्याप्रकारे पूर्वी केलेल्या कामाचे अनुभव असलेबाबतचे दाखले.
- निविदा सादर करताना ग्रामपंचायतीचे स्थळ पाहणी पत्र जोडणे बंधनकारक आहे यानुसार निविदाधारक यांनी कामाच्या ठिकाणी प्रत्यक्ष भेट देवून तिथल्या अडचणी व जागेची पाहणी करून घेणे बंधनकारक आहे जेणे करून कामाच्या वेळी येणाऱ्या अडचणी याची कल्पना येईल व काम मिळाल्यानंतर ग्रामपंचायत एंक्वे कोणतीहीबाब ऐकून घेणार नाही व काम वेळेत पूर्ण होईल.

लिफाफा क्र. २ मध्ये स्कॅन करून अपलोड करावयाची कागदपत्रे

- BOQ.

ग्रामसेवक
ग्रामपंचायत एंक्वे
ता. कोरेगाव जि. सातारा

सरपंच
ग्रामपंचायत एंक्वे
ता. कोरेगाव जि. सातारा

बंधपत्र

कामाचे नाव –

मी /आम्ही गांभीर्यपूर्वक नमूद करतो की मी /आम्ही वर नमूद केलेल्या कामाच्या ई -निविदेच्या सर्व अटी शर्ती काळजीपूर्वक वाचल्याअसून या निविदेसाठी माझे /आमचे दर निविदे सोबत असलेल्या BOQफाईल मध्ये नमूद करित आहोत .जर माझी /आमची निविदा स्वीकृत करण्यात आली तर या निविदेतील सर्व अटी व शर्ती चे पालन करण्यास मी /आम्ही बांधील राहू .या अटी व शर्तीचा मी /आम्ही भंग केल्यास या निविदेतील अटी व शर्तीमध्ये दिलेल्या तपशिला नुसार मी /आम्ही दंडनीय कार्यवाहीस पात्र राहू .याशिवाय माझी /आमची निविदा मंजूर झाल्यास कामासाठी चांगल्यादज्याचे साहित्य वापरून हे काम प्राधिकृत केलेल्या अधिकाऱ्यांच्या मार्गदर्शनाखाली दर्जात्मक काम करण्याची मी /आम्ही हमी देतो

तसेच संकेत स्थळावर ई -निविदेच्या ई -लिफाफा क्रमांक १ व २ मध्ये जी आवश्यक कागदपत्रे स्कॅनकरून अपलोड करत आहे. ती सत्य आहेत असे सत्य प्रतिज्ञेवर लिहून देत आहे.

वरील सर्व अटी व शर्ती मला /आम्हास मान्य आहेत.

स्थळ :

दि- .

निविदा धारकाची सही व शिक्का

नाव :

पत्ता :

मोबाईल क्र: .

TECHNICAL SPECIFICATION OF SPV POWER PLANT (10 kWp Grid Connected)

DEFINITION

A Grid Tied Solar Rooftop Photo Voltaic (SPV) power plant consists of SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter, and Controls & Protections, interconnect cables and switches. PV Array is mounted on a suitable structure. Grid tied SPV system is without battery and should be designed with necessary features to supplement the grid power during day time. Components and parts used in the SPV power plants including the PV modules, metallic structures, cables, junction box, switches, PCUs etc., should conform to the BIS or IEC or international specifications, wherever such specifications are available and applicable.

General System

1. The operating life of the plant shall be minimum 25 years.
2. The plant shall feed AC power to the Low Tension (LT) / High Tension (HT) distribution grid power supply through adjacent substation.
3. The plant shall monitor solar generated energy using plant DC/AC energy meter/Bidirectional energy meter independent of load energy monitoring. Remote monitoring facility must be made available.
4. The plant shall consist of PV array, fixed PV array support structure, String/Array combiner boxes, DC cabling, DC distribution box, Inverter, AC cabling, AC distribution box, plant AC energy meter, load energy meter and data acquisition system.
5. The individual Solar PV array shall be installed on existing roof top of the building using fixed PV array support structure.
6. The individual string / array combiner boxes and DC cabling shall be installed on roof top of the building.
7. The inverter shall be installed in the control room / open space provided in the building as per requirement of beneficiary and site requirement.
8. The DC and AC distribution boxes, DC and AC cabling, energy meters and data acquisition system shall be installed in the control room / open space provided in (or near) the building.

1. PV Array/ Modules:

The total solar PV array capacity should not be less than 10kWp comprise of solar polycrystalline modules with minimum capacity of 300Wp and above wattage. The module type must be qualified as per IEC 61215 latest edition for polycrystalline silicon or IEC 61646 for other latest technology and as per latest IEC/IS/BIS standard. SPV module conversion efficiency should be equal to or greater than 16% under STC. Modules must qualify to IEC 61730 Part I and II for safety qualification testing.

- a. The PV modules used should be made in India.
- b. The peak power rating of the Solar PV array under Standard Temperature Conditions (STC) shall be equal to the peak power rating of the plant.

- c. The PV array shall consist of framed multi-crystalline.
- d. Individual PV modules rating should be of minimum 300 Wp at STC and cumulative quantity shall be matching to rated output at application end.
- e. The rated maximum power rating of PV modules should have positive tolerance in range of 0 to +3%. And negative temperature co-efficient of power for PV modules should be less than or equal to 0.45% per degree C. The peak power point voltage and the peak-power point current of any supplied module and / or any module string (series connected modules) shall not vary more than 3 (three) percent from the respective arithmetic means for all modules and/or for all module strings, as the case may be.
- f. A suitable number of Solar PV modules shall be connected in a series string. A suitable number of series strings shall be connected in parallel to formulate a series parallel array.
- g. The PV Array shall be designed to match the inverter input specifications.
- h. The module shall be provided with junction box with provision of min. 3 Nos. of by-pass diodes and external MC4 type or equivalent plug-in connectors. The junction box should have hinged, weatherproof lid with captive screws and cable gland entry points & should be IP 65 rated.
- i. The front surface of the module shall consist of impact resistant, low iron and high transmission toughened glass.
- j. The module frame shall be made of corrosion resistant material electrically compatible with structural material used for mounting the modules.
- k. Each PV module manufactured in India must have RF identification tag (RFID) compatible with MNRE requirements. (Traceability requirement)
- l. DC negative conductor shall be bonded to the ground via Ground Fault Detector Interrupter (GFDI). The grounding point shall be as close as possible to the PV Array.
- m. The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode with associated electrical connectivity with cells of the module. The box shall have hinged, weather proof lid with captive screws and cable gland entry points or may be of sealed type and IP65 rated.
- n. The PV module must have 10 years free replacement guarantee against material defect or craftsmanship.
- o. The maximum degradation of PV modules should not exceed 1% per year.
- p. It may be noted that from 1st April 2013 onwards; RFID shall be mandatory placed inside the module laminate

2. Inverter (Power Conditioning Unit)

The PCU required shall be of 10 kWp to convey DC power produced by SPV modules into AC power and adjust the voltage & frequency levels to meet the local grid conditions.

Common Technical Specification

Control Type: Voltage source, microprocessor assisted, output regulation.

Output voltage: 3 phase, 415 V AC (+12.5%, -20% V AC)

Frequency: 50 Hz (+3 Hz, -3 Hz)

Continuous rating: 10+KVA with Import/Export net metering

Normal Power: 10+KVA

Total Harmonic Distortion: less than 3%

Operating temperature Range: -25 °C to 60 °C

Humidity: 95 % Non-condensing

Housing cabinet: PCU to be housed in suitable switch cabinet, IP-20(Minimum) for indoor IP-65(Minimum) for outdoor

PCU efficiency: 98% and above at full load.

PF: > 0.9 (0.9 lead to 0.9 lagging)

Other important Features/Protections of PCU:

- a. Mains (Grid) over-under voltage and frequency protection as per CEA regulation.
- b. Over load capacity (for 10 sec) should be 200% of continuous rating.
- c. The PCU shall be self commuted and shall utilize a circuit topology and components suitable for meeting the specifications listed above at high conversion efficiency and with high reliability.
- d. The PCU shall be provided with MPPT (Maximum Power Point Tracing) features, so that maximum possible power can be obtained from the PV module.
- e. The PCU shall be self commuted and shall utilize a circuit topology/ DSP technology to meet the specifications listed above at high conversion efficiency and with high reliability. The PCU shall give the preference to feed the Loads from Solar Energy being produced and shall draw the additional power from mains to meet the load requirements in the case load is more than solar energy being produced. Conversely it should feed the solar power to the Grid if the load is less than the solar energy generated.
- f. Full proof protection against grid islanding which ensures that the PV power and the grid power get disconnected immediately in the event of grid failure.
- g. The power conditioning units / inverters should comply with applicable IEC/ equivalent BIS standard for efficiency measurements and environmental tests as per standard codes IEC 61683/IS 61683 and IEC 60068- 2(1,2,14,30) /Equivalent BIS Std.
- h. The charge controller (if any) / MPPT units environmental testing should qualify IEC 60068-2(1, 2, 14, 30)/Equivalent BIS std. The junction boxes/ enclosures should be IP 65(for outdoor)/ IP 54 (indoor) and as per IEC 529 specifications.
- i. The PCU / inverters should be tested from the MNRE approved test centres / NABL / BIS / IEC accredited testing- calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses.
- j. The PCU shall be capable of operating in parallel with the grid utility service and shall be capable of interrupting line-to-line fault currents and line-to-ground fault currents.
- k. The PCU shall be able to withstand an unbalanced output load to the extent of 50%.

- l. The PCU shall go to the shut down/standby mode with its contacts open under the following conditions before attempting and automatic restart after an appropriate time delay in insufficient solar power output.

- Utility-Grid Over or Under Voltage

The PCU shall restart after an over or under voltage shutdown when the utility grid voltage has returned to within limits for a minimum of two minutes and as per CEA regulation.

- Utility-Grid Over or Under Frequency

The PCU shall restart after an over or under frequency shutdown when the utility grid voltage has returned to the within limits for minimum of two minutes. The permissible level of under/over voltage and under/over grid frequency.

- j. The PCU shall not produce Electromagnetic interference (EMI) which may Cause malfunctioning of electronic and electrical instruments including communication equipment, which are located within the facility in which the PCU is housed.

The inverter with MPPT shall be used with the power plant.

- k. The sine wave output of the inverter shall be suitable for connecting to 415V, 3 phase AC LT voltage grid as per grid standard.
- l. The inverter shall incorporate transformer isolated output (transformer-less inverters shall be used with suitable external transformers), grid islanding protection disconnection of grid & PV power in case of failure of Grid supply suitable DC / AC fuses / circuit breakers and voltage surge protection. Fuses used in the DC circuit shall be DC rated.
- m. The inverter shall have internal protection against any sustained faults and/or lightening in DC and mains AC grid circuits.
- n. The peak inverter efficiency inclusive of built-in isolation transformer shall exceed 94%. (Typical commercial inverter efficiency normally more than 97%, and transformer efficiency is normally more than 97%)
- o. The kVA ratings of inverter should be chosen as per the PV system wattage.
- p. The output power factor should be of suitable range to supply or sink reactive power.
- q. Inverter shall provide panel for display of PV array DC voltage, current and power, AC output voltage and current (All 3 phases and lines), AC power (Active, Reactive and Apparent), Power Factor and AC energy (All 3 phases and cumulative) and frequency. Remote monitoring of inverter parameters should also be available.
- r. The inverter shall include adequate internal cooling arrangements (exhaust fan and ducting) for operation in a non-AC environment.

3. Balance of Systems (BoS)

- a. String / Array combiner boxes shall incorporate DC string circuit breakers, DC array disconnect switch, lightning and over voltage protectors, any other protection equipment, screw type terminal strips and strain-relief cable glands.
- b. All DC and AC cables shall be terminated using suitable crimped cable lugs/sockets and screw type terminal strips. No soldered cable termination shall be accepted.
- c. Suitable Ground Fault Detector Interrupter (GFDI) shall be incorporated either with the inverter or with the array combiner box.

- d. String/Array combiner boxes shall be secured onto walls or metal structures erected separately on the terrace.
- e. Conduits / concealed cable trays shall be provided for all DC cabling on the Roof top. Conduits / concealed cable trays shall be adequately secured onto the roof top / wall.
- f. The AC cable type shall be XLPE insulated, suitably armoured, 1100V grade multi-stranded copper conductor. Appropriate colour coding shall be used.
- g. For the DC cabling, XLPE or, XLPO insulated and sheathed, UV-stabilized single core multi-stranded flexible copper cables shall be used; Multi-core cables shall not be used.
- h. The DC and AC cables of adequate electrical voltage and current ratings shall be also rated for in conduit wet and outdoor use.
- i. The total DC cable losses shall be maximum of 2% of the plant rated DC capacity over the specified ambient temperature range.
- j. The DC and AC cable size shall be selected to maintain losses within specified limits over the entire lengths of the cables.
- k. DC cables from array combiner box on the rooftop to DC distribution box in the control room and DC/ AC cabling between inverter and distribution boxes shall be laid inside cable duct where available or secured with conduits/concealed cable trays where duct is not available.
- l. The DC and AC distribution boxes shall be wall mounted inside control room/open space.
- m. DC distribution box shall incorporate DC disconnect switch, lightning surge protectors, any other protection equipment, screw type terminal strips and strain-relief cable glands.
- n. AC distribution box shall incorporate AC circuit breaker, surge voltage protectors, any other protection equipment, plant energy meter, screw type terminal strips and strain-relief cable glands.
- o. The total AC cable losses shall be maximum of 1% of the plant AC output over the specified ambient temperature range.
- p. All cable conduits shall be GI/HDPE type.
- q. All cable trays shall be powder coated steel or GI or equivalent.
- r. For DC side installation if armoured cable use at thermoplastic insulated polyamide gland to be used to hold cable. The armoured cable should not be lathed at any point on the DC side.

4. Array Structure:

- a. Hot dip galvanized mounting structures may be used for mounting the modules / panels / arrays. Each structure should have angle of inclination as per the site conditions to take maximum insolation. However to accommodate more capacity the angle inclination may be reduced until the plant meets the specified performance ratio requirements.

- b. 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. Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed.
- c. The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759.
- d. Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. Aluminium structures also can be used which can withstand the wind speed of respective wind zone. Necessary protection towards rusting need to be provided either by coating or iodization.
- e. The fasteners used should be made up of stainless steel. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels.

f. Cables and Wires:

Cables of appropriate size to be used in the system shall have the following characteristics:

- Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards
- Temp. Range: -10oC to +80oC.
- Voltage rating 660/1000V
- Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
- Flexible
- Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum (2%)
- For the DC cabling, XLPE or, XLPO insulated and sheathed, UVstabilized single core multi-stranded flexible copper cables shall be used; Multi-core cables shall not be used.
- For the AC cabling, PVC or, XLPE insulated and PVC sheathed single or, multi-core multi-stranded flexible copper cables shall be used; Outdoor AC cables shall have a UV-stabilized outer sheath.
- The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use. Outer sheath of cables shall be electron beam cross-linked XLPO type and black in colour.
- The DC cables from the SPV module array shall run through a UV stabilized PVC conduit pipe of adequate diameter with a minimum wall thickness of 1.5mm.
- Cables and wires used for the interconnection of solar PV modules shall be provided with solar PV connectors (MC4) and couplers.
- All cables and conduit pipes shall be clamped to the rooftop, walls and ceilings with thermo-plastic clamps at intervals not exceeding 50 cm; the minimum DC cable size shall be 4.0 mm²

copper; the minimum AC cable size shall be 4.0 mm² copper. In three phase systems, the size of the neutral wire size shall be equal to the size of the phase wires.

- Cable Routing / Marking: All cable/wires are to be routed in a GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable easily identified. In addition, cable drum no. / Batch no. to be embossed/ printed at every one meter.
- Cable Jacket should also be electron beam cross-linked XLPO, flame retardant, UV resistant and black in colour.
- All cables and connectors for use for installation of solar field must be of solar grade which can withstand harsh environment conditions including High temperatures, UV radiation, rain, humidity, dirt, salt, burial and attack by moss and microbes for 25 years and voltages as per latest IEC standards. DC cables used from solar modules to array junction box shall be solar grade copper (Cu) with XLPO insulation and rated for 1.1kV as per relevant standards only.
- The ratings given are approximate. Project developer to indicate size and length as per system design requirement. All the cables required for the plant shall be provided by the Project developer. Any change in cabling sizes if desired by the Project developer shall be approved after citing appropriate reasons. All cable schedules/ layout drawings shall be approved prior to installation.
- Multi Strand, Annealed high conductivity copper conductor PVC type 'A' pressure extruded insulation or XLPE insulation. Overall PVC/XLPE insulation for UV protection Armoured cable for underground laying. All cable trays including covers to be provided. All cables conform to latest edition of IEC/ equivalent BIS Standards as specified below: BoS item / component Standard Description Standard Number Cables General Test and Measuring Methods, PVC/XLPE insulated cables for working Voltage up to and including 1100 V, UV resistant for outdoor installation IS /IEC 69947.
- The total voltage drop on the cable segments from the solar PV modules to the solar grid inverter shall not exceed 2.0%.
 - a. The total voltage drop on the cable segments from the solar grid inverter to the building distribution board shall not exceed 2.0%.

6. Protection:

(a) Lighting Protection

The SPV power plants shall be provided with lightning & over voltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc the entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors. Lightning protection should be provided as per NFC 17-102:2011 standard. The protection against induced high-voltages shall be

provided by the use of metal oxide varistors (MOVs) and suitable earthing such that induced transients find an alternate route to earth.

(b) Surge Protection

Internal surge protection shall consist of three MOV type surge-arrestors connected from +ve and –ve terminals to earth (via Y arrangement)

(c) Earthing Protection

1. Each array structure of the PV yard should be grounded properly. In addition the lighting arrester/masts should also be provided inside the array field. Provision should be kept be provided inside the array field. Provision should be kept for shorting and grounding of the PV array at the time of maintenance work.
2. All metal casing/shielding of the plant should be thoroughly grounded in accordance with Indian electricity Act. /IE Rules.
3. Earth resistance should be tested in presence of the representative of NRHM after earthing by calibrated earth tester.
4. PCU, ACDB & DCDB should be earthed properly.
5. Danger boards should be provided as and where necessary as per IE Act/IE rules as amended up to date.
6. Three signage shall be provided one each at battery –cum-control room, solar array area and main entry from administrative block.
7. PV array, DC equipment, Inverter, AC equipment and distribution wiring shall be earthed as per IS: 3043 - 1987.
8. Equipment grounding (Earthing) shall connect all non-current carrying metal receptacles, electrical boxes, appliance frames, chassis and PV panel mounting structures in one long run. The grounding wire should not be switched, fused or interrupted.
9. The complete earthing system shall be electrically connected to provide return to earth from all equipment independent of mechanical connection.
10. The equipment grounding wire shall be connected to PV power plant.
11. A separate grounding electrode shall be installed using earth pit per power plant. Test point shall be provided for each pit.
12. An earth bus and a test point shall be provided inside each control room.
13. Earthing system design should be as per the standard practices and as per latest IEC standard.

(d) Grid Islanding

1. In the event of a power failure on the electric grid, it is required that any independent power-producing inverters attached to the grid turn off in a short period of time. This prevents the DC-to-AC inverters from continuing to feed power into small sections of the grid, known as “islands.” Powered islands present a risk to workers who may expect the area to be un powered , and they may also damage grid-tied equipment. The Rooftop PV system shall be equipped with islanding

protection. In addition to disconnection from the grid (due to islanding protection) disconnection due to under and over voltage conditions shall also be provided.

2. A manual disconnect 4pole isolation switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personnel to carry out any maintenance. This switch shall be locked by the utility personnel.

(c) Electrical Safety

1. Internal Faults: In built protection for internal faults including excess temperature, commutation failure, overload and cooling fan failure (if fitted) is obligatory.
2. Over Voltage Protection: Over Voltage Protection against atmospheric lightning discharge to the PV array is required. Protection is to be provided against voltage fluctuations and internal faults in the power conditioner, operational errors and switching transients.
3. Earth fault supervision: An integrated earth fault device shall have to be provided to detect eventual earth fault on DC side and shall send message to the supervisory system.
4. Cabling practice: Cable connections must be made using PVC Cu cables, as per BIS standards. All cable connections must be made using suitable terminations for effective contact. The PVC Cu cables must be run in GL trays with covers for protection.
5. Fast acting semiconductor type current limiting fuses at the main bus bar to protect from the grid short circuit contribution.
6. The PCU shall include an easily accessible emergency OFF button located at an appropriate position on the unit.
7. The PCU shall include ground lugs for equipment and PV array grounding.
8. All exposed surfaces of ferrous parts shall be thoroughly cleaned, primed, and painted or otherwise suitably protected to survive a nominal 30 years design life of the unit.
9. The PCU enclosure shall be weatherproof and capable of surviving climatic changes and should keep the PCU intact under all conditions in the room where it will be housed. The INVERTER shall be located indoor and should be either wall / pad mounted. Moisture condensation and entry of rodents and insects shall be prevented in the PCU enclosure.
10. Components and circuit boards mounted inside the enclosures shall be clearly identified with appropriate permanent designations, which shall also serve to identify the items on the supplied drawings.
11. All doors, covers, panels and cable exits shall be gasket or otherwise designed to limit the entry of dust and moisture. All doors shall be equipped with locks. All openings shall be provided with grills or screens with openings no larger than 0.95 cm. (about 3x8 inch).
12. In the design and fabrication of the PCU the site temperature (5° to 55°C), incident sunlight and the effect of ambient temperature on component life shall be considered carefully. Similar consideration shall be given to the heat sinking and thermal for blocking diodes and similar components.

7. Grid Connectivity and metering arrangement:

1. The maximum capacity for interconnection with the grid at a specific voltage level shall be as specified in the Distribution Code/Supply Code of the State and amended from time to time.
2. Following criteria have been suggested for selection of voltage level in the distribution system.

Plant Capacity	Connecting voltage
Up to 10 kW	240V-single phase or 415V-three phase at the option of the consumer
Above 10kW and up to 100 kW	415V – three phase
Above 100kW	At HT/EHT level (11kV/33kV/66kV) as per DISCOM rules

3. Utilities may have voltage levels other than above; DISCOMS may be consulted before Finalization of the voltage level and specification is made accordingly.
4. The bidirectional electronic energy meter (Net-meter) shall be Supplied and installed for the measurement of import/Export of energy in compliance with Utility requirements.

8. DC Distribution Board (DCDB)

- a. DC Distribution panel to receive the DC output from the array field.
- b. DC DPBs shall have sheet from enclosure of dust & vermin proof conform to IP 65 protection. The bus bars are made of copper of desired size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors.

9. AC Distribution Board (ACDB)

- a. AC Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter, and should have necessary surge arrestors. Interconnection from ACDB to mains at LT Bus bar while in grid tied mode.
- b. All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS 60947 part I, II and III.
- c. The changeover switches, cabling work should be undertaken by the Project developer as part of the project.
- d. All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air - insulated, cubical type suitable for operation on three phase / single phase, 415 or 230 volts, 50 Hz
- e. The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.
- f. All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better.
- g. Should conform to Indian Electricity Act and rules (till last amendment).
- h. All the 415 AC or 230 volts devices / equipment like bus support insulators, circuit breakers, SPDs, VTs etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions

10.TOOLS & TACKLES AND SPARES :-

- a. After completion of installation & commissioning of the power plant, necessary tools & tackles are to be provided free of cost by the Project developer for maintenance purpose. List of tools and tackles to be supplied by the Project developer for approval of specifications and make from MEDA/ owner.
- b. A list of requisite spares in case of PCU/inverter comprising of a set of control logic cards, IGBT driver cards etc. Junction Boxes. Fuses, MOVs / arrestors, MCCBs etc along with spare set of PV modules be indicated, which shall be supplied along with the equipment. A minimum set of spares shall be maintained in the plant itself for the entire period of warranty and Operation & Maintenance which upon its use shall be replenished.

11. DANGER BOARDS AND SIGNAGES :-

- a. Danger boards should be provided as and where necessary as per IE Act. /IE rules as amended up to date. Three signage shall be provided one each at battery –cum- control room, solar array area and main entry from administrative block. Text of the signage may be finalized in consultation with owner.

12. FIRE EXTINGUISHERS :-

- a. The fire fighting system for the proposed power plant for fire protection shall be consisting of:

- Portable fire extinguishers in the control room for fire caused by electrical short circuits.
- Sand buckets in the control room.
- The installation of Fire Extinguishers should confirm to TAC regulations and BIS standards.

The fire extinguishers shall be provided in the control room housing PCUs as well as on the Roof or site where the PV arrays have been installed.

13. SAFETY MEASURES :-

- a. The Project developer shall take entire responsibility for electrical safety of the installation(s) including connectivity with the grid and follow all the safety rules & regulations applicable as per Electricity Act, 2003 and CEA guidelines etc.

14. DISPLAY BOARD :-

- a. The Project developer has to display a board at the project site (above 10 kWp) mentioning the following: a. Plant Name, Capacity, Location, Type of Renewable Energy plant (Like solar wind etc.), Date of commissioning, details of tie-up with transmission and distribution companies, Power generation and Export FY wise.
- b. The size and type of board and display shall be appropriate.

15. Operation and Maintenance (O&M)

- a. Cleaning of solar PV modules with soft water, wet and dry mops : Weekly
- b. DC String / Array and AC Inverter monitoring: Continuous and computerized.
- c. AC Energy monitoring: Continuous and computerized.
- d. Visual Inspection of the plant : Monthly
- e. Functional Checks of Protection Components and Switchgear: Quarterly.

- f. Spring Clean PV Array and Installation Area: Quarterly.
- g. Inverter, transformer, data acquisition, energy meters and power evacuation checks: Half Yearly.
- h. Support structure and terrace water-proofing checks: Yearly.
- i. O & M log sheet shall be provided and maintained.
- j. The repair/replacement work shall be completed within 48 hours from the time of reporting the fault.
- k. A half yearly performance report of the plant inclusive of energy generation data shall be provided as per approved format.
- l. All recorded data for the first 5 years shall be preserved in both manual and computer format and submitted at hand over.
- m. An Operation, Instruction and Maintenance Manual, in English and the local language, should be provided with the Solar PV Power Plant and detail of Wiring and Connection Diagrams will also be provided with the manual.

16. Comprehensive Maintenance Contract (CMC)

- a. The complete Solar PV Power Plant must be guaranteed against any manufacturing / design/ installation defects for a minimum period of 5 years.
- b. PV modules used in Solar PV Power Plant must be guaranteed for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.
- c. During the CMC period, MNRE / MEDA / users will have all the rights to cross check the performance of the Solar PV Power Plant. MEDA may carry out the frequent inspections of the Solar PV Power Plant installed and randomly pick up its components to get them tested at Govt. / MNRE approved any test centre. If during such tests any part is not found as per the specified technical parameters, MEDA will take the necessary action. The decision of MEDA/Employer in this regard will be final and binding on the bidder.

s. Warranties and Guarantees

- a. Solar Modules: Workmanship/ product replacement for 10 years.
- b. Solar Modules: 90% power output for 10 years & 80% power output for 25 years.
- c. Inverter: Workmanship/product replacement for 5 years, service for 25 years
- d. Power Evacuation and Metering Equipment: Workmanship/product replacement for 10 years, service for 25 years
- e. BoS: Parts and Workmanship for 10 years, service for 25 years.
- f. Power Plant Installation : Workmanship for 10 years, service for 25 years
- g. PV Array Installation : Structural for 25 years

18. DATA ACQUISITION SYSTEM / PLANT MONITORING :-

- Data Acquisition System shall be provided for each of the solar PV plant above 10 kWp capacity.
- Data Logging Provision for plant control and monitoring, time and date stamped system data logs for analysis with the high quality, suitable PC. Metering and Instrumentation for display of systems parameters and status indication to be provided.
- Temperature: Temperature probes for recording the Solar panel temperature and/or ambient temperature to be provided complete with readouts integrated with the data logging system.
- The following parameters are accessible via the operating interface display in real time separately for solar power plant:
 - a. AC Voltage.
 - b. AC Output current.
 - c. Output Power
 - d. Power factor.
 - e. DC Input Voltage.
 - f. DC Input Current.
 - g. Time Active.
 - h. Time disabled.
 - i. Time Idle.
 - j. Power produced
 - k. Protective function limits (Viz-AC Over voltage, AC Under voltage, Over frequency, Under frequency ground fault, PV starting voltage, PV stopping voltage.
- All major parameters available on the digital bus and logging facility for energy auditing through the internal microprocessor and read on the digital front panel at any time) and logging facility (the current values, previous values for up to a month and the average values) should be made available for energy auditing through the internal microprocessor and should be read on the digital front panel.
- PV array energy production: Digital Energy Meters to log the actual value of AC/ DC voltage, Current & Energy generated by the PV system provided. Energy meter along with CT/PT should be of 0.5 accuracy class.
- Computerized DC String/Array monitoring and AC output monitoring shall be provided as part of the inverter and/or string/array combiner box or separately.
- String and array DC Voltage, Current and Power, Inverter AC output voltage and current (All 3 phases and lines), AC power (Active, Reactive and Apparent), Power Factor and AC energy (All 3 phases and cumulative) and frequency shall be monitored.
- Computerized AC energy monitoring shall be in addition to the digital AC energy meter.
- The data shall be recorded in a common work sheet chronologically date wise. The data file shall be MS Excel compatible. The data shall be represented in both tabular and graphical form.
- All instantaneous data shall be shown on the computer screen.
- Software shall be provided for USB download and analysis of DC and AC parametric data for individual plant.

- Provision for instantaneous Internet monitoring and download of historical data shall be also incorporated.
- Remote Server and Software for centralized Internet monitoring system shall be also provided for download and analysis of cumulative data of all the plants and the data of the solar radiation and temperature monitoring system.
- Ambient / Solar PV module back surface temperature shall be also monitored on continuous basis.
- Simultaneous monitoring of DC and AC electrical voltage, current, power, energy and other data of the plant for correlation with solar and environment data shall be provided.
- Remote Monitoring and data acquisition through Remote Monitoring System software at the owner / MEDA location with latest software/hardware configuration and service connectivity for online / real time data monitoring / control complete to be supplied and operation and maintenance / control to shall be provided.
- The Project developer shall be obligated to push real-time plant monitoring data on a specified intervals (say 15 minute) through open protocol at receiver location (cloud server) in XML/JSON format, preferably.

19. Test Reports

The test certificate of various components of the proposed SPV system should be in accordance with guidelines of MNRE for grid Solar PV systems and related Addendums/ Minutes of meeting published on MNRE website. Test certificates from MNRE approved test centres shall only be considered valid.

20. Other Features:

Sr. No.	Particulars		Specifications
			10 kWp SPV Plant
1	Solar PV Modules		
	a	Capacity	10000 Wp
	b	Make	Any MNRE approved OR IEC 61215 or as per latest IEC/IS standards
	c	Module	300 or 300+ Wp
	d	No. of SPV Modules	Depends on Module wattage
2	Module Mounting Structure		As per the available places at site
3	Inverter/Power Conditioning Unit (As per design specification given in tender, that includes charge controller, inverter & Grid charger. The output power should be of 3 phase)		Minimum 10 kW
4	Cabling with casing capping		As required at site
6	Transmission, Distribution & point wiring		As required at site
7	Monitoring, Control & protection device		1 Set
8	Metering at generation side		1 No. (at DC side of Inverter)
9	Metering at consumption side		1 No. (Towards Load)
10	Spares		Set of required fuses, screws, etc as required.

