Department of Electrical Inspectorate
Office of the Chief Electrical Inspector
Housing Board Buildings, Shanthi Nagar
Thiruvananthapuram 695 001
Phone: 0471 2331104 , 0471 2331159
email : ceikerala@gmail.com
Web site: www. ceikerala.gov.in

भारतीय मानक ब्यूरो IS 15700
मानक: पथप्रदर्शक
BUREAU OF INDIAN STANDARDS SQMS

An IS 15700 : 2005 Certified Department

No : B2-12439/2020/CEI

Thiruvananthapuram
Date: 14/10/2020

CIRCULAR

Subject: - Installation of Solar Energy System -guide lines issued –regarding

Reference: - CircularNo. B2-13958/17/CEI dated 24.07.2018

For the effective implementation of Solar Plants, the following guide lines are issued.

Guidelines for scrutiny / inspection of Solar Energy System

a).Technical

1. The minimum qualification for carrying out the installation work of a solar energy system shall be a licensed B-Class Contractor. Depending up on the capacity of the installation, eligible contractors can carry out the work.
2. Verify whether the inverter is grid tied or not. Inverter capacity shall be selected based on the solar PV generation, so that maximum generation can be utilized. The design of inverter should be as per the Indian / International Standard and efficiency of the inverter should be more than 97%.
3. Solar inverter details and its specifications and Solar PV module details such as number of modules, wattage, voltage, current etc. shall be verified.
4. PV module shall be MNRE approved. The certificate of MNRE approval shall be verified. If the PV module is not MNRE approved, certificate from MNRE approved lab shall be obtained.
5. In the grid tied System, ensure that there is no back feeding to the grid when grid supply is off and anti-islanding protection shall be ensured during grid failure including neutral. The Inverter should shut down automatically if there is a power blackout or a fault with SPV for safety of the personal and other equipments. Certificate from the manufacturer shall be obtained.
6. In case consumer want to use SPV power for its use at the time of grid failure, he has to install an automatic switching system to isolate grid supply from SPV system to use the supply from SPV with Battery system safely.
7. The adequacy of cable size for solar PV system shall be verified and ensured. The cable shall be UV Protected. If the inverter is installed in the lower floor, the DC cable shall be laid through the outer wall of the building.
8. An energy meter shall be provided for recording the solar energy generated.
9. If it is grid tied, it shall be ensured that Bi-directional meter (Net meter) is provided at the interconnection point to record the import and export of energy.
10. Battery and inverter shall be segregated properly with fire proof partition or minimum 75 cm clearance shall be ensured between them. Easy and safe accessibility to panel for cleaning shall be provided.
11. If the proposed installation is having a DG set, reverse power relay shall be provided to avoid back feeding to DG set.

12. A lockable Isolator should also be installed at the point of inter connection with the grid connected SPV system which should be accessible to the utility staff to isolate the system at the time of maintenance of the distribution system.
13. PV module frames, array structures, equipment and enclosures, AC conductors and lightning conductors shall be earthed as per IS 3043/2018 and section 7.4.2 of IEC 62458/2016. AC and DC side earthing shall be interconnected.
14. Frames of all PV modules shall be connected to one continuous earthing conductor. The earthing conductor shall be rated for 1.56 times the maximum short circuit current of the PV array.
15. The minimum size of earthing conductor for PV equipment shall be 6 mm^2 if copper, 10 mm^2 if aluminium or 70 mm^2 if hot-dipped galvanized iron.Resistance between any point of the PV system and earth should not be greater than 5 Ω. All the earthing should be provided with two parallel paths with separate earth electrodes.
16. Each string should be provided with two fuses, one connected to the positive and the other to the negative terminal of the string.
17. PV string connected in parallel shall have matched open circuit voltage within 5% per string to avoid circulating current. (Refer section 5.1.6 of IEC 62548/2016).
18. Cable size for PV string cable, PV sub-array cable and PV array main cable shall be selected as per section 7.3.7 of IEC 62548/2016.
19. DC surge arresters shall be provided at DC side and it shall be of Type 2 (as per IEC 61643-1, IEC 62548/2016) rated at a continuous operating voltage of at least 125 percent of the open-circuit voltage of the PV string, and a flash current of more than 5 A. As the string inverters used for roof top PV systems do not allow more than 800 VDC, surge arrestors rated for 1,000 VDC are commonly used. The surge arrestors should be connected to both positive and negative outgoing terminal of the string junction box. If the inverter is provided with in-build SPD this may not be insisted.AC side of inverter shall also be provided with a SPD of adequate rating. SPDs shall be selected based on the voltage impulse withstanding capacity of the equipment to be protected.
20. For large PV systems a dedicated lightning protection system shall be provided as per IEC 62305 and section 7.4.2 of IEC 62548/2016. Existing lightning protection of a building may be considered sufficient for this purpose, provided it adequately protects the installation area.
21. All PV equipment installed outdoors should have an ingress protection rating of at least IP65. All the inverters installed outdoor shall be recommended to provide an additional shading arrangement to avoid direct sunlight and rain.
22. All the PV equipment shall be labelled as per IEC 62446-2009-05.
    1. All circuits, protective devices, switches and terminals shall be suitably labelled.
    2. All DC junction boxes shall be labelled for indicating active parts inside the boxes fed from a PV array.
    3. Main AC isolating switch shall be clearly labelled with dual supply warning and a single line wiring diagram shall be displayed.
    4. Inverter protection settings, installer details and emergency shutdown procedures shall be displayed on site.
23. PV system shall not inject DC current greater than 1 percent of the inverter rated output current into the grid.
24. Solar inverters shall be rated for THD of less than 3 percent of power injected into the grid.
25. Galvanized iron (GI) or aluminium shall be used for module mounting structures.

The installation shall conform to the following Act, Rules, Regulations & Standards:

1. Central Electricity Authority (Installation and Operation of Meters) Regulations, 2010 as amended from time to time.
2. The relevant provisions of the Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010 and The Electricity Act, 2003.
3. The relevant provisions of CEA Regulations as notified by CEA (Standard for Connectivity of Distributed Generation Resources) Regulation, 2013.
4. CEA (Technical Standard for Connectivity of the Grid) Regulation, 2007 as amended from time to time.
5. Kerala State Electricity Regulatory Commission (Renewable Energy and Net metering) Regulations, 2020.
6. National Solar Mission-Best Practice Guide published by MNRE, Govt. of India, 2016 shall be referred for general guidelines.
7. Various orders/circulars/Technical specifications related to solar plants published by the State Government & Kerala State Electricity Regulatory Commission.

b).General

1. For the installation of 10kW and up to and including 30kW, completion report and single line diagram shall be submitted by the consumer through a competent electrical contractor and sanction for energisation shall be obtained from the district office concerned. If the said installation is an addition to the existing HT installation, then the as-fitted drawings for such changes shall get approved from the district office.
2. For the installation above 30kW and below 500kW, prior scheme approval and sanction for energisation orders shall be obtained from the district office concerned.
3. For the installations including 500kW and above, prior scheme approval and sanction for energisation orders shall be obtained from the office of the Chief Electrical Inspector.
4. For the scrutiny and inspection, the check list given in the annexure shall be followed.
5. The following tests shall be conducted at the time of inspection:
    a. PV Module: Irradiance measurement, angle of inclination, temperature of the PV module and V-I characteristics using PV Array Tester.
    b. Solar Inverter: Efficiency, input voltage, output voltage, power, THD, DC injection flicker etc. and anti-islanding protection.
6. While issuing sanction for energisation for Solar Energy System, following conditionis to be included in addition to normal conditions:
    a. Consent from the licensee shall be obtained (In case of grid tied system).

Chief Electrical Inspector

Copy to :-

1. The Deputy Chief Electrical Inspector / Electrical Inspector.
2. CA to Chief Electrical Inspector.
3. CA to Additional Chief Electrical Inspector.
4. Technical Officer, CEI Office.
5. Stock File.