

TECHNICAL PARAMETER OF PV MODULE AND VARIOUS OTHER COMPONENTS FOR USE IN GRID CONNECTED SOLAR POWER PLANTS

PRODUCT SPECIFICATIONS :

1. PV MODULE QUALIFICATION

The PV modules used in the grid connected solar power Projects must qualify to the latest edition of any of the following IEC PV module qualification test or equivalent Indian standards.

Standard	Description
IEC 61215-1 Ed. 1.0	Terrestrial photovoltaic (PV) modules – Design qualification and type approval - Part 1: Test requirements
IEC 61215-1-1 Ed. 1.0	Terrestrial photovoltaic (PV) modules – Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules
IEC 61215-1-2 Ed. 1.0	Terrestrial photovoltaic (PV) modules – Design qualification and type approval - Part 1-2: Special requirements for testing of thin-film Cadmium Telluride (CdTe) based photovoltaic (PV) modules
IEC 61215-1-3 Ed. 1.0	Terrestrial photovoltaic (PV) modules – Design qualification and type approval - Part 1-3: Special requirements for testing of thin-film amorphous silicon based photovoltaic (PV) modules
IEC 61215-1-4 Ed. 1.0	Terrestrial photovoltaic (PV) modules – Design qualification and type approval - Part 1-4: Special requirements for testing of thin-film Cu(In,Ga)(S,Se) based photovoltaic (PV) modules
IEC 62108 Ed. 2.0	Concentrator photovoltaic (CPV) modules and assemblies - Design qualification and type approval
IEC 61730-1 Ed. 2.0	Photovoltaic (PV) module safety qualification – Part 1: Requirements for construction
IEC 61730-2 Ed.2	Photovoltaic (PV) module safety qualification – Part 2: Requirements for testing
IEC 61701 Ed.2	Salt mist corrosion testing of photovoltaic (PV) modules (Applicable for coastal and marine environment)
IEC 62716 Ed.1	Photovoltaic (PV) modules - Ammonia corrosion testing (Applicable for wet atmospheres having high concentration of dissolved ammonia)
IEC TS 62804-1 Ed.1	Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation - Part 1: Crystalline silicon

2. POWER CONDITIONERS/ INVERTERS

Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation - Part 1: Crystalline silicon

Standard	Description
IEC 61683 Ed. 1	Photovoltaic systems - Power conditioners – Procedure for measuring efficiency
IEC 62109-1 Ed. 1	Safety of power converters for use in photovoltaic power systems - Part 1: General requirements
IEC 62109-2 Ed. 1	Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters
IEC 61000-6-2 Ed. 2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments
IEC 61000-6-4 Ed. 2.1	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments	Utility-interconnected photovoltaic inverters – Test procedure of islanding prevention measures/ IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems / Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
IEC 60068-2-1:2007	Environmental testing - Part 2-1: Tests - Test A: Cold
IEC 60068-2-2:2007	Environmental testing - Part 2-2: Tests - Test B: Dry heat
IEC 60068-2-14:2009	Environmental testing - Part 2-14: Tests - Test N: Change of temperature
IEC 60068-2-30:2005	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)
LVRT Compliance	As per the latest CERC Guidelines / Order/ Regulations
Grid Connectivity	Relevant CERC Regulations (including LVRT Compliance) and Grid Code as amended and revised from time to time.

As per the Solar Photovoltaic's, Systems, Devices and Components Goods Order, 2017, PV Modules and Inverters used in the grid connected solar power Projects shall conform to the Standards Specified as per below and bear the Standard Mark as notified by the Bureau of Indian Standards:

Sl. No. (1)	Product (2)	Indian Standard Number (3)	Title of Indian Standard (4)
1	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules (Si wafer based)	IS 14286	Crystalline Silicon Terrestrial Photovoltaic (PV) modules – Design Qualification And Type Approval
2	Thin-Film Terrestrial Photovoltaic (PV) Modules (a-Si, CIGS and CdTe)	IS 16077	Thin-Film Terrestrial Photovoltaic (PV) Modules – Design Qualification and Type Approval
3	PV Module (Si wafer and Thin film)	IS/ IEC 61730 (Part 1) IS/ IEC 61730 (Part 2)	Photovoltaic (PV) Module Safety Qualification Part 1 Requirements for Construction Photovoltaic (PV) Module Safety Qualification Part 2 Requirements for Testing
4	Power converters for use in photovoltaic power system	IS 16221 (Part 1) IS 16221 (Part 2)	Safety of Power Converters for use in Photovoltaic Power Systems Part 1- General Requirements Safety of Power Converters for Use in Photovoltaic Power Systems Part 2- Particular Requirements for Inverters
5	Utility –Interconnected Photovoltaic inverters	IS 16169	Test Procedure of Islanding Prevention Measures for Utility- Interconnected Photovoltaic Inverters
6	Storage battery	IS 16270	Secondary Cells and Batteries for Solar Photovoltaic Application General Requirements and Methods of Test

3. CABLES AND CONNECTORS

All cables and connectors to be used for installation of solar field must be of solar grade which can withstand harsh environment conditions for 25 years and voltages as per latest IEC standards. It is recommended that the Cables of 600-1800 Volts DC for outdoor installations should comply with the BS/ EN EN50618/ TUV 2pfg 1169/08/07 for Service life expectancy of 25 years.

4. OTHER SUB-SYSTEMS/ COMPONENTS

Other subsystems/ components used in the SPV Power Plants (Cables, Connectors, Junction Boxes, Surge Protection Devices etc.) must also conform to the relevant international/national Standards for Electrical Safety besides that for Quality required for ensuring Expected Service Life and Weather Resistance.

5. AUTHORIZED TEST CENTRES

The PV modules/ Power Conditioners deployed in the Power Plants must have valid test certificates for their qualification as per above specified IEC/ BIS Standards by one of the NABL Accredited Test Centers in India. In case of module types/ equipment for which such Test facilities may not exist in India at present, test certificates from reputed ILAC Member body accredited Labs abroad will be acceptable.

6. WARRANTY

- PV modules used in grid connected solar power plants must be warranted for peak output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.
- The modules shall be warranted for at least 10 years for failures due to material defects and workmanship.
- The mechanical structures, electrical works and overall workmanship of the grid solar power plants must be warranted for a minimum of 5 years.
- The Inverters/ PCUs installed in the solar power plant must have a warranty for 5 years.