How to carry out Solar PV Testing?

Unlike most other electrical systems, the DC side of PV cannot always be switched off or made dead to allow electrical testing to be performed – you cannot switch off the Sun. In any case, certain electrical tests require irradiance data (Solar power per unit area) to be considered as part of the testing procedure (when comparing to Standard Test Conditions, STC).

Verifying any electrical system generally falls into two parts; the first, a visual inspection, which should be performed before any of the electrical testing is undertaken.

A visual inspection can help to ensure there are no problems with the PV system, for example, damage to the modules, cable connectors, wiring or other PV components such as invertors or combiner boxes. Visual inspection should happen, not only as part of the commissioning process, but also, during periodic testing.

If we consider AC testing, AC Modules, micro-inverters or DC optimizers as beyond the scope of this article, we need to consider electrical testing of the DC side of a PV system. This testing, however, falls into two categories; System Testing and Measurement and System Performance Testing.

1, System Testing and Measurement; testing of the DC side of a PV system generally incorporates the following;

> Continuity testing, or resistance testing, is undertaken to verify the integrity of the protective earth, grounding or equipotential bonding conductors and connections. Correct grounding / earthing of a PV system is required to reduce the risk of electrical shock to personnel.

Please note, not all PV systems, especially small older systems, are grounded or earthed.

Polarity testing is required to ensure correct connection to other components in the system such as inverters, charge controllers or batteries where cross polarity can result in a loss in efficiency as a minimum, but at worst, be extremely dangerous.

Voltage and current testing is performed to verify the PV system is operating within the design specifications. The Open Circuit Voltage (Voc) and Short Circuit Current (Isc) are commonly used to confirm these characteristics.

Insulation resistance testing is used to identify faults to the insulation by testing the integrity of wiring and equipment.

Functional testing ensures items such as switchgear and other control devices, are mounted, connected and operating correctly.

2, System Performance Testing;

Performance testing of PV systems is required to ensure the PV system is operating according to the system design. This generally involves voltage and current measurements and can include I-V Curve tracing. Comparison to Standard Test Conditions (STC) must be performed which takes into consideration the temperature, irradiance and spectral data (at the time of measuring) and, when combined with the electrical measurements, is used to verify the power and energy of the PV system and enables comparison to manufacturers specifications.

If you require more help, please contact us at https://www.seaward.com/sitemap/enquiry/.