

## **IS 16077 : 2013 – Your criteria for selecting Thin-film PV modules**

Photovoltaic (PV) devices use semiconducting materials to convert sunlight into electrical energy. A single PV device is called a cell, and cells are connected together to form modules or panels. The three most common types of PV cell technologies are monocrystalline silicon, polycrystalline silicon, and thin film.

Thin-film PV modules are solar panels made by depositing one or more thin layers of photovoltaic material on a substrate. These modules are known for their lightweight, flexibility, and potential lower cost compared to traditional crystalline silicon modules. Common types of materials used in thin-film modules include amorphous silicon (a-Si), cadmium telluride (CdTe), and copper indium gallium selenide (CIGS).

This standard does not apply to modules used with concentrators. This Indian Standard which is identical with IEC 61646 stipulated the design qualification and type approval of thin-film terrestrial photovoltaic (PV) modules for long-term operation in open-air climates

A module design shall be judged to have passed the qualification tests, and therefore, to be type approved, if each test sample meets all the criteria defined in the Standard. However, any change in the design, materials, components or processing of the module may require a repetition of some or all of the qualification tests to maintain type approval

**Performance Requirement:** The maximum power output of a solar panel at Standard Test Conditions (STC) not less than 90 % of the minimum value specified by the manufacturers. Specifications for maximum power output (P<sub>max</sub>) and relevant electrical parameters, such as open-circuit voltage (V<sub>oc</sub>) and short-circuit current (I<sub>sc</sub>), must be met.

**Electrical Characteristics:** Insulation test is carried out to determine whether or not the module is sufficiently well insulated between current carrying parts and the frame or the outside world. Modules are subjected to various environmental tests to assess their performance and durability in different conditions, including exposure to humidity, thermal cycling, and mechanical loads

Safety requirements include ensuring adequate insulation resistance, protection against electric shock, and fire safety standards. Reliability assessments involve long-term stability testing to verify that modules maintain performance over time despite environmental stresses.

In summary, IS 16077:2013 establishes essential guidelines for the production and testing of thin-film PV modules, ensuring that they meet safety, performance, and durability standards that protect consumer interests and promote the growth of solar energy adoption.