

IS 16221 (Part 2) : 2015
IEC 62109-2 : 2011

Safety of Power Converters for Use in Photovoltaic Power Systems

Part 2 Particular Requirements for Inverters

Inverters play a crucial role in ensuring the safe operation of photovoltaic (PV) systems, especially as solar power becomes more widely used around the world. Compliance with these standards helps manufacturers improve the reliability, efficiency, and safety of their PV systems, offering consumers added protection and confidence in the safety and performance of their solar equipment.

Indian Standard IS 16221 (Part 2): 2015, equivalent to the international standard IEC 62109-2:2011, details safety requirements for inverters in photovoltaic power systems. These systems can include grid-interactive, stand-alone, and multi-mode inverters, potentially with batteries or other energy storage.

Key Safety Concerns

The standard specifies protection against **electric shock, fire hazards, and mechanical hazards**. Tests are mandated to evaluate array insulation resistance, residual current detection, and inverter backfeed current, which all contribute to minimizing potential risks.

Fault Tolerance and Additional Requirements

Single-fault condition testing is required to ensure the reliability of protective measures, particularly for **grid-interactive inverters**. This includes verifying the proper operation of residual current monitoring and the ability of **automatic disconnection mechanisms** to maintain safe isolation between the PV array and the mains in a fault situation. The standard also includes a “**blanketing test**” simulating obstructed airflow over the inverter’s heatsink to prevent fire or shock hazards from overheating.

Marking and Documentation

Clear markings and documentation are crucial for user safety. The standard mandates providing information on inverter ratings, transformer specifications, and non-sinusoidal output waveform details. Installers and users should also consult and adhere to other relevant safety standards and guidelines referenced in the document, such as IEC 60364-7-712, IEC 61008-1, and IEC 61727.