TESTING AND MEASURING EQUIPMENT/ALLOWED SUBCONTRACTING

Safety of power converters for use in photovoltaic power systems – Part 2: Particular requirements for inverters

IEC 62109-2:2011

R = Required by Lab
S = May be subcontracted

Clause	Testing	Testing / measuring equipment / material needed	Subcontracting
4.4.4	Single fault conditions to be applied	- AC power source (1 or 4 quadrant, variable frequency) - DC power sources (SAS – Solar Array Simulator) - Loads capable of sourcing and sinking the PCE input and output under rated conditions. (3 phase, min 5kVA /phase for all devices above) - Power analyser with data recording capability - Current Transformers - Resistive shunts or current transducers - Cheesecloth & white tissue-paper - VOM or similar device – shall indicate RMS value for AC measurements - Oscilloscope with standard probes - Dielectric tester – Hipot - Mega-ohm meter	R
4.4.4.17	Cooling system failure – Blanketing test	Same as 4.4.4 in general plus: - Surgical cotton of minimum uncompressed thickness of 2cm)Temperature Chamber (4.4.4.17); or means to reach in-verter operating temperature - Timer	R

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Clause	Testing	Testing / measuring equipment / material needed	Subcontracting
4.7.4	Stand-alone Inverter AC output voltage and frequency	- DC power sources (SAS – Solar Array Simulator) - Loads capable of sourcing and sinking the PCE input and output under rated conditions (3 phase, min 5kVA /phase for all devices above) - Power analyser with data recording capability - Current Transformers - Resistive shunts or current transducers - Resistive loads - Oscilloscope with standard probes	R
4.7.5	Stand-alone inverter output voltage waveform	- DC power sources (SAS – Solar Array Simulator) - Loads capable of sourcing and sinking the PCE input and output under rated conditions (3 phase, min 5kVA /phase for all devices above) - Power analyser with data recording capability - Current Transformers - Resistive shunts or current transducers	R
4.8.2	Array insulation resistance detection for inverters for ungrounded and functionally grounded arrays	- AC power source (1 or 4 quadrant, variable frequency) - DC power sources (SAS – Solar Array Simulator) - Loads capable of sourcing and sinking the PCE input and output under rated conditions. (3 phase, min 5kVA /phase for all devices above) - Power analyser with data recording capability - Current Transformers - Resistive shunts or current transducers - Oscilloscope with standard probes - Adjustable resistances (i.e. R=V_{max} /30mA)	R

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Clause	Testing	Testing / measuring equipment / material needed	Subcontracting
4.8.3.2	30 mA touch current type test for isolated inverters	- AC power source (1 or 4 quadrant, variable frequency) - DC power sources (SAS – Solar Array Simulator) - Loads capable of sourcing and sinking the PCE input and output under rated conditions. (3 phase, min 5kVA /phase for all devices above) - Power analyser with data recording capability - Current Transformers - Resistive shunts or current transducers - Oscilloscope with standard probes - Touch current measurement circuit of IEC 60990, Figure 4	R
4,8.3.3	Fire hazard residual current type test for isolated inverters	- AC power source (1 or 4 quadrant, variable frequency) - DC power sources (SAS – Solar Array Simulator) - Loads capable of sourcing and sinking the PCE input and output under rated conditions. (3 phase, min 5kVA /phase for all devices above) - Power analyser with data recording capability - Current Transformers - Resistive shunts or current transducers - Current meter capable of measuring AC and DC components with bandwidth at least 2 kHz	R

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Clause	Testing	Testing / measuring equipment / material needed	Subcontracting
4.8.3.5	Protection by residual current monitoring	- AC power source (1 or 4 quadrant, variable frequency) - DC power sources (SAS – Solar Array Simulator) - Loads capable of sourcing and sinking the PCE input and output under rated conditions. (3 phase, min 5kVA /phase for all devices above) - Power analyser with data recording capability - Current Transformers - Resistive shunts or current transducers - Oscilloscope with standard probes - Current meter capable of measuring AC and DC components with bandwidth at least 2 kHz - Adjustable capacitors and resistances(for residual current detection (refer to IEC 62109-2, Figure 21)	R