VeraSol

Overview of VeraSol Solar Generator Test Method

Testing solar generators safety, quality and durability, performance, and consumer protection

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	Safety	Quality and Durability	Energy Performance/ Service Delivery	Consumer Protection
Battery & Charge Controller	• Battery safety documentation	• Battery capacity • Battery durability • Battery overcharge protection	• Solar charging tests • Grid charging tests • Discharge tests • Standby energy loss	• Visual screening of product packaging and documentation, including user manual and warranty
Inverter	• Inverter safety documentation	• Inverter documentation	• Inverter efficiency	
Full System	• Output overload protection	• Visual screening • Protection from miswiring • Protection from PV overvoltage • Circuit breaker (RCD) functionality test • Testing of switches, connectors, cable strain relief • Evaluation of PV cable specifications • Assessment of AC and DC port outputs	• Energy service calculations	

Overview of Test Methods

Section	Procedure	Purpose	Output	Adapted from
Required Documentation	IEC 62109-1 and IEC 62109-2	Requires testing to IEC 62109-1 and IEC 62109-2 to evaluate inverter characteristics and performance	Submitted documentation, inverter waveform type, load, and total harmonic distortion	N/A
	Declaration of PAYG metering	Companies must submit a declaration ensuring that solar generators that have pay-as-you-go metering are capable of accurately metering service to customers, so they reliably get the service that is paid for	Submitted documentation	IEC TS 62257-9-8
	Wiring and connector safety declaration	Companies must submit a declaration that all wiring in the product meet the requirements for conductor sizing in robustness	Submitted documentation	IEC TS 62257-9-8
	Battery Specification Sheet and Safety Data Sheets	Companies must submit battery specification sheets from the battery manufacturer showing at a minimum, acceptable deep discharge protection and overcharge protection thresholds, as well as a Safety Data Sheet to declare the battery chemistry	Submitted documentation	IEC TS 62257-9-8
	Specific requirements for lithium-based batteries	Companies must submit the documentation for lithium-ion batteries showing overvoltage protection and cell balancing	Submitted documentation	IEC TS 62257-9-8
	AC-DC power supply safety	Any included AC-DC power supply shall carry a recognized consumer electronics safety certification with accompanying valid documentation	Submitted documentation	IEC TS 62257-9-8
	Company-provided PV specifications	Company shall specify a PV module or array to use for the solar charging efficiency test and energy service calculations	PV specifications for testing	N/A

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Visual Screening	Visual screening	Documents product properties, functionality, observations and internal and external durability and workmanship	Qualitative and quantitative assessment of the product	IEC TS 62257-9-5
Consumer Information	Consumer information	A hard copy of the packaging and other consumer-facing product documentation is sampled with the device and inspected during the visual screening process	Qualitative and quantitative assessment	IEC TS 62257-9-5
Sample Labeling and Wiring	Sample labeling and wiring	Prepares the samples for testing	N/A	ISO/IEC 17025 and IEC TS 62257-9-5
Battery Performance Aspects	Battery capacity	Measures the quantity of electricity which a fully charged battery can deliver under specified conditions, which affects the run time of products	Electricity delivered under specified conditions in ampere-hours (Ah)	IEC TS 62257-9-5
	Battery durability	Measures battery capacity degradation from storage, which can indicate batteries that could degrade prematurely under typical use	Percent capacity loss from storage (%)	IEC TS 62257-9-5

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Performance Tests	Solar charging efficiency test	Measures the maximum power point tracking (MPPT) efficiency, or how effectively the solar charge controller extracts the maximum power from a solar panel and transfers it to the battery, both with and without output loads	Static MPPT efficiency and conversion efficiency with the battery only and static MPPT efficiency with daytime loads	IEC 62891 and IEC TS 62257-9-5
	Discharge test	Measures the energy available from the battery in a typical discharge cycle and determines the end-of-discharge voltage	Full battery run-time in hours (h), energy removed from the battery until the device reaches a low-voltage disconnect or other stopping criterion (Wh), and depth of discharge and low-battery voltage (Wh)	IEC TS 62257-9-5
	Grid charge test	Measures the time the device takes to charge from near empty to a state of charge close to 100% using an included AC-DC power adapter	Grid charge time in hours (h)	IEC TS 62257-9-5
	Standby loss test	Measures the standby loss of a device when not in use	Standby time, or the time it would take for the battery to discharge from 50% state of charge to its low-voltage disconnect with no external loads connected, in hours (h)	IEC TS 62257-9-5
	Energy service calculations	Estimate overall system performance and provide comparative metrics between products	Daily energy available to loads after a standard solar day in kilowatt-hours per day (kWh/day) and estimated solar charging time for a product to receive a full charge (h)	IEC TS 62257-9-5

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Protection and Ports Tests	Miswiring	Assesses whether the device is protected against improper wiring and component connections	Presence of sufficient protection against miswiring (pass/fail)	IEC TS 62257-9-5
	PV overvoltage protection	Determines if the device is protected from high voltage from a PV module	Presence of sufficient PV overvoltage protection (pass/fail)	IEC TS 62257-9-5
	RCD functionality test	Determines whether the residual current device (RCD) (if present) is functional to cut off electrical supply if it detects an imbalance in the electrical current flow	Product should disconnect power at 30 mA and function normally after reset (pass/fail)	
	Output overload protection	Confirms that the AC and DC outputs are protected against overloads and short circuits and that they can safely operate with the maximum current applied	Presence of sufficient protection (pass/fail)	IEC TS 62257-9-5 and A2EI
	Overcharge protection	Assesses whether the battery is protected from excessive charging	Presence of overcharge protection and overcharge protection voltage (V)	IEC TS 62257-9-5
	Assessment of AC output ports	Assesses AC port functionality	Ensure ratings on product and documentation match the ratings in the IEC 62109-2 report	IEC 62109-2
	Assessment of DC output ports	Assesses DC port functionality	Output voltage range and current-voltage relationship over a variety of operating conditions and the efficiency of the path from the battery to the port	IEC TS 62257-9-5 and IEC 62257-9-8

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Durability Tests	Switches and connectors	Determines if the switches and connectors of the device can withstand the rigors of expected daily use	Switch and connector functionality, user safety, and damage after testing	IEC TS 62257-9-5
	Flexible and moving parts	Determines if flexible or hinged parts that contain wires can be bent without exhibiting major defects	Flexible and moving part functionality, user safety, and damage after testing	IEC TS 62257-9-5
	Cable strain relief	Determines if the strain relief mechanism of cables protects cable ends from major defects	Functionality and damage after testing	IEC 62109-1 and IEC TS 62257-9-5
	Evaluation of PV cable specifications	Confirms that PV module conductors are appropriately sized to safely carry the current of the PV module	PV cable specifications	IEC TS 62257-9-5
	Screw connections test	Testing that screw connections intended to be tightened during installation can be screwed and unscrewed without damage	Compliance with the test and no damage incurred	IEC TS 62257-9-5
	Requirements for non-plug-and-play products	Outlines requirements for connections to be fitted by end-users and installation professionals for non-plug-and-play systems	Meets outlined requirements based on product type and installation specifications (yes/no)	IEC TS 62257-9-8