

Lighting Global Quality Assurance

Version 2

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Off-grid Lighting Product Quality Screening Procedure, Logistics, and Cost

Lighting Global has developed two quality-screening methods to meet the unique needs of stakeholders in the market for off-grid lighting products: the Quality Test Method (QTM) and Initial Screening Method (ISM). Both methods are faster and less expensive (lower personnel and equipment costs), but less thorough than other established test procedures for lighting products such as PV GAP, and have been institutionalized as IEC/TS 62257-9-5 ed2.0. Each method is described below, followed by a table providing descriptions of each test and a reference to the appropriate section(s) in the IEC/TS 62257-9-5 ed2.0 document containing the test procedures and reporting requirements, and an indication of the sample size used for both test methods.

Quality Test Method (QTM): This set of test methods is the flagship method for Lighting Global. The results are used to qualify products for Associate Status with the Lighting Africa and Lighting Asia programs and officially verify the accuracy of claims made by manufacturers on specification sheets.

- 18 product units will need to be randomly selected from a warehouse either at the product's assembly location or in the commercial market, which will then be sent to the testing laboratory.
- A sample size of 6 is used for each test, and Lighting Global aims to provide results from these tests in approximately 4 months.

Initial Screening Method (ISM): This is an abbreviated version of the QTM that is designed to provide even lower cost and faster turnaround. The applications of the Initial Screening Method are getting rapid feedback about emerging products for manufacturers, distributors, government agents, and NGOs and offering a low-cost assessment of a new product's likelihood of passing the full QTM. This screening can also assist companies with ongoing product research and development. The ISM is not designed as an end in itself.

- 3 product units are selected by companies themselves and are provided for screening.
- A sample size of 1 is used for each test, and Lighting Global aims to provide results from these tests in approximately 6 weeks.

QTM and ISM: Descriptions & Key Information

Test Name and Description	IEC/TS 62257-9-5 ed2.0 References	Typical Equipment Required	QTM	ISM
Visual Screening —Evaluates the mechanical, electrical, and physical properties and quality of the product. Wiring, solder joints, switches, and basic functional elements are inspected to reveal obvious flaws and catalog the attributes of the product.	<i>Procedure:</i> Subclauses F.4.1, F.4.2, and F.4.3 <i>Reporting:</i> Subclause F.5	Hand tools, calipers/ruler, balance (scale), camera, DC voltmeter or multimeter, task light, <i>AND</i> skilled technician	n=6	n=1
PV Module I-V Curve —Determines the electrical performance characteristics of the PV module under standard test conditions (STC) and typical module operating conditions (TMOT)	<i>Procedure:</i> Subclauses Q.4.1 and Q.4.2 <i>Reporting:</i> Subclause Q.5	Indoor solar simulator with PV tester <i>OR</i> outdoor I-V curve test unit of sufficient quality with fast-response pyranometer, DC voltmeter or multimeter, and surface-mounted thermocouples	n=6	n=1
Battery Capacity —Measures the charge capacity of the battery (amp-hours) over a specified series of charge-discharge cycles.	<i>Procedure:</i> Subclauses K.4.2, K.4.3, K.4.4, K.4.5, and K.4.6 <i>Reporting:</i> Subclause K.5	Programmable battery analyzer	n=6	n=1
Charge Controller —Identifies and characterizes the level of battery protection and the amount of standby loss.	<i>Procedure:</i> Subclauses S.4.1, S.4.2, S.4.3, S.4.4, and S.4.5 <i>Reporting:</i> Subclause S.5	Laboratory DC power supply, DC voltmeter or multimeter, <i>AND</i> DC ammeter	n=6	n=1
Full-Battery Run Time —Measures the run time of the lighting system at various brightness settings (if applicable) starting from a full battery charge.	<i>Procedure:</i> Subclauses M.4.1 and M.4.2 <i>Reporting:</i> Subclause M.5	Photometer, voltage measurement device, and current measurement device with data logging capability, programmable battery analyzer, <i>AND</i> photometric test cavity (sphere, cube, or other relative measurement cavity)	n=6	n=1
Lighting Service (Illuminance) —Measures the illuminance provided by task and ambient lights, with specialized measurement techniques for each.	<i>Procedure:</i> Subclauses T.4.3, T.4.4, T.4.5, T.4.6, and T.4.7 <i>Reporting:</i> Subclause T.5	Photometer, task plane grid, DC laboratory power supply, DC voltmeter or multimeter, <i>AND</i> ambient rotational illuminance measurement device	n=6	n=1

Test Name and Description	IEC/TS 62257-9-5 ed2.0 References	Typical Equipment Required	QTM	ISM
Lighting Service (Lumens) —Measures the luminous flux emitted from the lighting system.	<i>Procedure:</i> Subclauses I.4.2 and I.4.3 <i>Reporting:</i> Subclause I.7	Multi-plane test apparatus with illuminance meter, integrating sphere, OR goniophotometer; laboratory DC power supply; DC voltmeter OR multimeter; DC ammeter	n=6	n=1
Color Characterization —Measures the spectral quality of the light emitted from the lighting system in terms of CRI and CCT.	<i>Procedure:</i> Subclauses I.5 and I.6 <i>Reporting:</i> Subclause I.7	Photometric measurement cavity with spectroradiometer, color-enabled photometer, integrating sphere, OR goniophotometer	n=6	--
Long-term Lumen Degradation —Measures the light output relative to the initial output over 2,000 operational hours (500 hours for ISM).	<i>Procedure:</i> Subclauses J.4.1 and J.4.2 <i>Reporting:</i> Subclause J.6	Laboratory DC power supply, photometric test cavity (sphere, cube, or other relative measurement cavity), DC voltmeter or multimeter, DC ammeter, AND photometer	n=6	n=1
Charging Behavior —Combines the results from previous sections to estimate the lighting service from a standard charging period.	<i>Procedure:</i> Solar: subclause R.4.5 Mechanical: subclause P.4.5 Grid: subclause O.4.5 <i>Reporting:</i> Solar: subclause R.5 Mechanical: subclause P.5 Grid: subclause O.5	Solar: programmable laboratory DC power supply, voltage and current measurement devices with data logging capability, resistors, resistance meter, AND thermocouples Mechanical: stopwatch and full-battery run time setup Grid: 230 V, 50 Hz power source and full-battery run time setup	n=6	n=1
Mechanical Durability —Drop tests determine the strength of mechanical elements.	<i>Procedure:</i> Subclause W.4.1 <i>Reporting:</i> Subclause W.5	Hard surface, tape measure, AND camera	n=6	n=1

Test Name and Description	IEC/TS 62257-9-5 ed2.0 References	Typical Equipment Required	QTM	ISM
Switches, Connectors, Goosenecks, and Strain Reliefs —Investigates durability over 1,000 cycles for switches, connectors, and goosenecks and investigates durability of strain reliefs using weights.	<i>Procedure:</i> Subclauses W.4.2, W.4.3, and W.4.4 <i>Reporting:</i> Subclause W.5	All: camera Strain relief: 2 kg weight, stopwatch, apparatus to hold component in specific orientations	n=6	n=1
Physical and Water Ingress Protection —Estimates level of protection from intrusion of physical objects and ingress of water	<i>Procedure:</i> Subclauses U.4.1, U.4.2, U.4.3, V.5.2, V.5.3, and V.5.4 <i>Reporting:</i> Subclauses U.5 and V.6	1 mm diameter rigid probe OR 12.5 mm diameter rigid probe, camera, <i>AND</i> controlled water source	n=6	n=1