Call for comments on
IEC Technical Specification 62257-9-5 ed2.0

Stakeholder Outreach Memo

April 2014

The Lighting Global Quality Assurance framework—including the Quality Test Method (QTM), Initial Screening Method (ISM) and Market Check Method (MCM)—provide valuable third-party information on product performance and quality to stakeholders in the off-grid lighting market. In April 2013, the Quality Assurance framework was institutionalized through International Electrotechnical Commission (IEC) Technical Specification (TS) 62257-9-5 ed2.0. The quality assurance framework and test methods described in IEC/TS 62257-9-5 ed2.0 were originally developed under Lighting Africa and are now used by all of the regional lighting programs: Lighting Africa, Lighting Asia and Lighting MENA.

Members of IEC Technical Committee 82 (TC82) will meet in June to begin the revision process for these test methods. The Lighting Global Quality Assurance team is in a position to propose revisions to the IEC for consideration. As an initial step, we have created a list of recommended updates for IEC/TS 62257-9-5 ed2.0 (see Tables 1 and 2).

We are interested in gathering feedback from stakeholders regarding our proposed updates and any additional updates you would suggest to improve the current test methods described in IEC/TS 62257-9-5 ed2.0. We plan to submit a list of comments and recommended updates to the IEC in late May (in advance of an IEC Technical Committee 82 meeting in June) and ask that all stakeholder comments are submitted to our team prior to May 14th.

Comments may be officially submitted to the Lighting Global Quality Assurance team through the online form at www.lightingglobal.org/activities/qa/stakeholder-engagement/.

Though we expect and encourage a wide range of comments during this stakeholder process, not all updates are guaranteed to be included in the current revision. Fortunately, this will not be the last chance to revise the document, and it is possible to request that the IEC set a short period before the next revision. Comments that could not be addressed during the current revision, such as complex or controversial changes, may be included in the next revision after additional research and discussion.

Table 1 presents the four most substantial updates proposed by the Lighting Global Quality Assurance team. Table 2 includes a list of additional updates we are proposing that we do not anticipate being controversial. Minor updates, such as fixing typos, formatting errors, and adding clarifications, are not included in either list. The proposed changes are organized by test procedure as listed in IEC/TS 62257-9-5 ed2.0. As not all stakeholders have access to the current test methods, we have

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provided detailed notes regarding our proposed changes. Where additional explanation is required, the item in the table is starred (*) and supporting information is included in the appendix, listed by their respective item numbers.

Table 1. The four most substantial updates to IEC/TS 62257-9-5 ed2.0 proposed by Lighting Global QA team.

Item #	Test	IEC Document Section	Page #	Proposed Change
1	MCM	7	57	Update the Market Check Method (MCM) to match the current Lighting Global Market Check Policy. This policy is available at www.lightingglobal.org/resources/lighting-global-program-documents . Currently the two methods are similar, but a few changes regarding sample size and process would harmonize the two.
2	FSM	9	64	Eliminate the Field Screening Method test and any references to this test. We are not aware of anyone who uses this method.
3	Battery Test	K	126	Change the battery test method for nickel-based batteries to more accurately calculate the battery efficiency. We propose that nickel-based batteries be charged to a 90% state-of-charge for measuring the battery efficiency, rather than being overcharged, as is currently prescribed in the test method.
4	Physical and Water Ingress	U	197	Add procedures for testing PV modules for physical and water ingress in Annex U. These procedures are detailed in a recently released Lighting Global policy available at www.lightingglobal.org/resources/lighting-global-program-documents

Table 2. Additional updates proposed by the Lighting Global QA team. Minor clarifications and corrections are not included.

Item #	Test	IEC Document Section	Page #	Proposed Change
5*	Introduction	Intro	12	Update the introductory text to that suggested in the Appendix below.
6	QTM	6.5 Table 22	52	Change the QTM testing requirements to recommend a sample size of 1 for IP assessment. Currently the document indicates that the sample size for the IP test should be 6. The smaller sample size is more practical for this test and matches current practices in the Lighting Global network.
7	QTM	6.6.1 Figure 6	54	Update the QTM test flow diagram to include the battery durability test and better match the current testing practices.
8	Standards and Targets	B	77	The informative Annex B provides an example set of thresholds for minimum quality standards and performance targets. As Lighting Global recently updated our Minimum Quality Standards and removed public references to performance targets, the standards included in Annex B no longer match those used by Lighting Global. We recommend updating Annex B so that it is consistent with current

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				Lighting Global program activities. This change would have no substantial impact as the Annex is "informative" (i.e., it does not contain material that is mandatory for the application of the document), not "normative."
9	Visual Screening	F.4.3.5	103	Consider including a qualitative assessment of glare in the visual screening of products using a low cost method.
10	Sample preparation	G.4.4	108	Require that test labs use "0.75 mm^2 (18 AWG) or larger" wires when preparing samples and make them as short as possible. This requirement is intended to minimize the introduction of resistance in the wire extensions that are added to the products for the purpose of completing a number of key tests.
11*	Power Supply Set-up Procedure	H.4	109	In practice, test laboratories have found that some products will not turn on after replacing the battery with a power supply during the lumen maintenance test and other photometric tests. We suggest including several troubleshooting techniques to address this issue. See the Appendix to review the suggested techniques.
12	Lumen Maint.	J.1	118	Change the wording of the lumen maintenance background section to state that, "test samples should be dedicated to this test until the test is completed. In cases where the battery is not required to conduct the lumen maintenance test, the DUT's battery can be used for other testing (e.g., battery durability testing)." Previously, the background stated that test samples should not be utilized for other testing.
13	Lumen Maint.	J.1	118	Consider adding language to the lumen maintenance test annex to state that a $L_{70} \geq$ 2 000 h judgment may be made at 1 000 h if all samples remain above L95 for the entire 1,000 hours (i.e., the relative light output cannot initially dip below L95 and then increase above L95 before the 1,000 hours is complete, and all products must remain above L95, not just the average).
14	Battery Test	K	126	Consider including procedures and guidelines for testing rechargeable alkaline batteries.
15	Battery Test	K	126	Some battery analyzers cannot detect a battery at a 0 V state and require that the battery be brought out of this state with an initial charge. To address this, we propose adding the note: "Note: If the battery analyzer does not recognize the battery upon starting any of the above steps, the battery output may have dropped to 0 V. If this is the case, a constant-voltage charge as specified in Table K.2 of Annex K from a power supply may be required to bring the battery out of a 0 V state of charge before the DUT's battery capacity is determined." This would also require including a "DC power supply" in the equipment requirements sections.

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16	Battery Test	K.4.4.4	130	Add a discharge and charge-discharge cycle to the start of the battery test for Li-ion and $LiFePO_4$ batteries.
17	Battery Test, Full Battery Run Time and Charge Controller	K.4, M.4.2.5, S.4.1.5 (c), S.4.2.5 (h), S.4.2.5 (n), and S.4.3.5 (d)	126, 142, 176, 178, 179, and 180	Add clauses to allow testers to bypass integrated circuits on batteries when necessary. Testers would be instructed to re-conduct tests with the equipment connected on the battery side of the integrated circuit in cases where: 1. the battery analyzer will not start the test 2. the tester decides that the results from the test are unexpected or faulty in some way 3. the measured deep discharge protection voltage is outside of the targets specified by the manufacturer (subclause D.3.1.2) 4. the DUT's battery voltage falls below the recommended deep discharge protection voltage specified in Annex L 5. the measured overcharge protection voltage is outside of the targets specified by the manufacturer (subclause D.3.1.2) 6. the DUT's battery voltage exceeds the recommended overcharge protection voltage specified in Annex L.
18	Battery Testing Rec. Practices	L.3 (Table L.1)	135	Change the "maximum battery testing voltage" to 4.26 V/cell for Li-ion batteries. The current maximum of 4.25 V/cell is within the range of the "recommended overcharge protection voltages" if the tolerance is included. The tester needs to be able to test above the recommended range to see whether a battery exceeds the recommended voltage. Make this change to 4.26 V/cell in all other relevant sections as well.
19	Full Battery Run Time	M.4.1.5	138	Consider altering the preparatory procedure for the full-battery run time test to account for products with charge controllers that would either allow a battery to continue charging beyond the standard set points used by the battery analyzer or not enable a battery to fill to its full capacity.
20	FBRT, OVP, LVD	M, S	136, 174	Include a maximum allowed value of 60 mΩ for the total series resistance added by the test apparatus for the full-battery run time (FBRT), over-voltage protection (OVP), and low voltage disconnect (LVD) tests.

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21	IV Curve Test	Q.4.1	154	Currently, indoor measurements of IV curves are required to be taken according to procedures detailed in IEC 60904-1 and temperature corrected according to procedures in IEC 60891. We propose that some of the requirements be relaxed for testing under TS 62257-9-5. These changes include: 1) not requiring a spectral mismatch correction if the reference cell and DUT are reasonably matched, 2) not requiring an instantaneous irradiance sensor, 3) allowing the use of a single thermocouple, 4) allowing the use of a front-mounted thermocouple procedure, and 5) allowing two alterations to the procedure specified in IEC 60891 for temperature correction, by allowing use of a single thermocouple and allowing the outdoor measurement procedure as an alternative.
22	Solar Charge Test	R	160	Allow test labs to use more sophisticated equipment (e.g. solar array simulator) to measure the solar run time instead of the prescribed "resistor box" setup.
23	Solar Charge Test	R.4.2	161	Add an accuracy requirement of 1% for the multimeter being used to measure resistance.
24	Charge Controller	S.4.2.5 (f)	178	Change the maximum charging temperature for nickel-based batteries to 60 °C.
25	Light Distribution	T	185	In the procedure for measuring light distribution, include: “Measure illuminance levels for the grid points that read a lux value greater than the resolution of the light meter and greater than 0,2 % of the maximum lux reading from the first surface measured.” This will address the issue of not needing to measure points below a certain low lux value.

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26	Physical and Water Ingress	U	197	We recommend several changes to the simplified IP-testing procedures presented in Annex U: 1) Include descriptions of IPx4 and IPx5 in Table U.1 and include that for IP5x and IPx5, "Must be tested by a laboratory that has been accredited to test according to IEC 60529. Laboratories shall use the procedure in IEC 60529; no simplified alternative is acceptable. " 2) Include simplified directions for a modified IPx4 test (as this procedure is used in testing PV modules) 3) Include a 5 minute minimum duration for IPx3 and IPx4 as is suggested by IEC 60529 4) Include in the simplified procedure for IPx3 and IPx4 that the tester should dry the DUT with a towel... " without moving the DUT from its orientation during testing" 5) Change IP2X and IP4X description to: "If the 12,5 mm probe can enter a part of the DUT's enclosure and touch electronic components, electrical connections or circuits, the DUT is estimated to fail the IP2x assessment for ingress of solid foreign objects. If the 1 mm probe can enter a part of the DUT's enclosure that contains electronic components, electrical connections or circuits, the DUT is estimated to fail the IP4x assessment for ingress of solid foreign objects. If the probe can enter an external jack, this is not considered a failure, unless it can enter the DUT's enclosure through the external jack. Document any failures with photographs and text."
27	Switches/ Connectors	W.4.2	211	Add language to the mechanical durability test to explicitly allow the use of mechanical devices to conduct the switch and connector and gooseneck tests.
28	Switches/ Connectors	W.4.2	211	Consider reducing the number of cycles required for the switch and connector tests. Currently tests require 1000 cycles.
29	Switches/ Connectors	W.4.2	211	Clarify that identical switches/connectors do not need to be tested twice per sample, but that if there are identical connectors/switches, then the testing position for identical switches/connectors should be alternated between samples. Also clarify what a cycle is by providing examples of what is involved in a cycle for a push button and a cycle for a rocker switch.
30	Battery Storage Durability	BB	256	Add a tolerance for the resistors used during the battery storage test. The suggested tolerance is +/- 20%, assuming the resistor has a tolerance of less than 5%.
31	Equipment Accuracies	New Annex	--	Include a table of required equipment accuracies as a normative annex. All other test annexes would refer to this annex, as needed.

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Appendix

Further explanation and background for certain proposed changes are included here and referenced by their respective item numbers from Table 2.

Item 5. We propose amending the introductory text to the following:

> "The IEC 62257 series provides support and strategies for and institutions involved in rural electrification projects. It documents technical approaches for designing, building, testing, and maintaining off-grid renewable energy and hybrid systems with AC nominal voltage below 500 V, DC nominal voltage below 750 V and nominal power below 100 kVA.
>
> These documents are recommendations:
>
> - to support buyers who want to connect with good quality options in the market,
> - to choose the right system for the right place,
> - to design the system,
> - to operate and maintain the system.
>
> These documents are focused only on technical aspects of rural off-grid electrification concentrating on, but not specific to, developing countries. They must not be considered as all inclusive to rural electrification. The documents do not describe a range of factors that can determine project or product success: environmental, social, economic, service capabilities, and others.
>
> Further developments in this field could be introduced in future steps.
>
> This consistent set of documents is best considered as a whole with different parts corresponding to items for safety, sustainability of systems, and costs. The main objectives are to support the capabilities of households and communities that use small renewable energy and hybrid off-grid systems and inform organizations and institutions in the off-grid power market.
>
> The purpose of this Part 9-5 of IEC 62257 series is to specify quality assurance strategies for stand-alone lighting kits, including product specifications, tests, and a standardized specifications sheet format. In addition to supporting the selection of products by project developers and implementers, quality assurance can help market support organizations, manufacturers, and governments achieve the goals they have for off-grid lighting projects."

Item 11. The following language would be included to enable laboratories to troubleshoot when a DUT will not turn on after replacing its battery with a power supply:

> "If the DUT will not turn on after replacing its battery with a power supply, try the following steps, in order. If the DUT turns off or drops to a lower light output setting after a period of time, try the following steps starting with step 2. If possible, consult the product manufacturer to ensure that any troubleshooting steps taken will not damage the product.
>
> 1) Follow the above guidelines in H.4.1 for replacing the DUT's battery with a power supply. If the product is solar-charged, plug in the DUT's solar module into its charging socket (plugging is not required for integrated DUTs) and shine a bright

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light very close to the solar module. The DUT's on/off switch may also need to be cycled. After the light turns on, the solar module may be removed.

2) Follow the above guidelines in H.4.1 for replacing the DUT's battery with a power supply. Use an additional power supply to provide a voltage-controlled input to the DUT's solar module socket (for products with external solar modules) at the solar module's maximum power point voltage (V_{mp}) and maximum power point (I_{mp}). (The product manufacturer may need to provide the appropriate values.) The connector from the DUT's solar module shall be cut, stripped, and used to supply the simulated solar power to the DUT's solar module socket. For products with integrated solar modules, the wires connecting the solar module to the PCB shall be cut, and the wire leads still connected to the PCB shall be stripped. The voltage-controlled input shall be supplied to these leads.

3) Instead of replacing the DUT's battery with a power supply, leave the battery connected within the DUT. Connect a "jumper" between the DUT's battery and electronics so that the battery voltage and current can be measured during the test. Also use an additional power supply to provide a voltage-controlled input to the DUT's solar module socket at the solar module's maximum power point voltage (V_{mp}) and maximum power point current (I_{mp}). (The product manufacturer may need to provide the appropriate values.) The connector from the DUT's solar module shall be cut, stripped, and used to supply the simulated solar power to the DUT's solar module socket. For products with integrated solar modules, the wires connecting the solar module to the PCB shall be cut, and the wire leads still connected to the PCB shall be stripped. The voltage-controlled input shall be supplied to these leads."

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