Quality Assurance:
A Guide for GOGLA members

March 2017

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1. Introduction

This paper provides an overview of the international quality standards and associated test methods and procedures and identifies numerous national standards, initiatives and regulations, relevant to pico-solar (PicoPV) products, solar home systems (SHS) and SHS components designed to serve off-grid markets around the world. This paper is intended to guide industry members and help them:

- Understand what QA involves and why it is important
- Understand which QA standards are relevant to them and where
- Understand the key steps, processes and timelines involved
- Know who to contact as they go through the various certification steps
- Access support and advice within GOGLA and the relevant certification bodies
- Engage with GOGLA to feedback and influence ongoing development of standards in the future

This paper is meant for internal use by GOGLA members. Some of the content has been extracted from and consolidates information from other sources, paraphrasing or inserting word-for-word where appropriate. All relevant references are provided.

What is QA and why is it important?

Quality Assurance (QA) may be defined as a system or process which assures a certain level of ongoing quality in a product. If a product can be demonstrated, through appropriate testing and checks, to achieve an agreed set of minimum quality standards, it may be certified by an appropriate certification body. Indeed, in order to access a market, products will typically need to have gone through a QA process and demonstrably met the appropriate standards, such as performance, safety and durability, all of which are important to ensure the market, its customers and indeed all stakeholders, are protected from poor quality.

The QA process typically involves submitting products to a laboratory for testing, after which the product quality is verified and the results are used to enable the manufacturer to bring that product to market. The specific requirements of each country vary, however, many countries, such as in Kenya, have standard bureaus which require pre-shipment verification certification (PVoC) prior to a product being imported. PVoC will only be issued if the products have passed the appropriate quality standards.

For the off-grid sector, there are numerous standards and specifications, such as those defined by the International Electrotechnical Commission (IEC), which should be met in order for different systems and components to be approved for use in different markets. The Lighting Global programme has also been instrumental in developing a quality assurance framework to serve the off grid sector with test methods and certification designed to ‘support the development of markets for modern off-grid lighting and energy systems and provide buyers with reliable technical information and connect them with manufacturers and sellers of quality-verified products.’
Global and national standards

Some quality standards are national in scope, whereas others have been designed for use and adoption internationally. In some cases, international standards are to all intents and purposes, incorporated as national standards, in others, international standards are used as a basis for national standards, but are modified to suit local interests. While there is a degree of standard harmonisation across the world, rules and procedures can vary from country to country and also from product category to product category. The next section provides a top-level overview of the International Electrotechnical Commission and the Lighting Global quality assurance framework.

2. IEC (International Electrotechnical Commission)

The IEC is an international body, made up of national committee members, that prepares and publishes International Standards and Technical Specifications for all electrical and electronic technologies. IEC standards have been adopted in over 100 countries. Of direct relevance to GOGLA members, IEC has published:

- International Standards for range of SHS components
- Technical specification 62257-9-5 relating to PicoPV products

This section provides an overview of:

- IEC structure, processes and terminology
- Standards relevant to GOGLA members
- How you can engage with IEC
- How GOGLA is represented at the IEC

International Standards and Technical Specifications

The IEC prepares and publishes International Standards and Technical Specifications for all electrical and electronic technologies and are described as follows:

- **International Standards** are ‘the result of an agreement between the National Committees of the IEC and may be used as they are, or may be implemented through incorporation in national standards of different countries.’

- **Technical Specifications** ‘approach International Standards in terms of detail and completeness, but have not yet passed through all approval stages either because consensus has not been reached or because standardization is seen to be premature.’

Relevant Technical Specifications/ International Standards

PicoPV products (10 watt peak and under)

- **Technical Specification: IEC-TS 62257-9-5** ( Governed by JWG 1 of IEC TC 82): In 2013, technical specification IEC/Ts 62257-9-5 incorporated Edition 2* of the PicoPV quality assurance framework developed by Lighting Global which includes:
  - Product specifications
  - Test methods
  - Standardized specifications sheets

*Edition 3 is due to be submitted to the IEC for approval in 2017.*
Solar Home System’s Component Standards:

- Solar Photovoltaic Modules: IEC 61730 and, IEC 61215 or IEC 61646.
- Solar Charge Controllers: IEC 62509 and IEC 62093
- Solar DC/AC Power Converters/Inverters: IEC 61683 and IEC 62109
- Solar Batteries: IEC 61427
- Li batteries: IEC 61950; Ni-Cd batteries: IEC 61951
- PV devices: IEC 60904
- Solar PV module Connection Cables: IEC 60227 or IEC 60502

All IEC standards and technical specifications are available for purchase through the IEC website. In the case of IEC-TS 62257-9-5, a limited number of discounts are available qualified stakeholders.

Technical Committees

IEC standards and specifications are written by Technical Committees (and sub-committees), which set programmes of work, which are approved by a technical management board. Technical Committee 82 (TC 82) is the forum which deals with photovoltaics (PV) and includes PicoPV products. TC82 exists to:

‘prepare international standards for systems of photovoltaic conversion of solar energy into electrical energy and for all the elements in the entire photovoltaic energy system. In this context, the concept "photovoltaic energy system" includes the entire field from light input to a photovoltaic cell to and including the interface with the electrical system(s) to which energy is supplied.’

Under the umbrella of TC82, ‘Joint Working Group 1 (JWG 1), has been set up specifically for Photovoltaic off grid systems, including decentralized rural electrification and hybrid systems’ to:

‘prepare standards and technical specifications for off-grid solar photovoltaic projects including the Decentralized Rural Electrification (DRE) projects and hybrid systems that are now being implemented in developing countries. The contents of the IEC 62257 series are a resource for the identification of energy solutions, and also of products that are technically best suited within the economic context. These documents are intended for use as guidelines, including assessing the quality of the service to the end users.’

Note: According to the topics, this joint working group will work with other IEC TCs and SCs as needed. The group is currently made up of 38 national committee members.

How TC 82 and JWG1 Operates

- Documents are shared on line to members for them to review and register votes.
- Physical discussions and voting take place during committee meetings

GOGLA Representation within TC 82 and JWG1

GOGLA has applied to become a ‘Category A liaison organisation’ which will give us the right to participate as members in the group and represent industry views.

How to Join TC 82 and JWG1

To become a member of TC82, you need join IEC through your national committee (see here). You may also contact the committee secretary who can advise you on next steps. At the time of writing, the committee secretary is George Kelly, who may be contacted here.
The Lighting Global Quality Assurance framework

The principle standards, relevant across different geographies and used by multiple stakeholders (e.g. Governments, NGOs, Tenders) are those originally developed by Lighting Global as defined by:

- **IEC/TS 62257-9-5 for PicoPV** (PicoPV Quality Standards were originally designed for products with a peak power up to 10 watts, but can be used for products up to 15 watts)
- **Lighting Global Solar Home System Kit Quality Assurance**: For ‘plug-and-play’ Solar Home System Kits with peak power between 10 W – 100 W. At time of writing this is to be extended to 350 W. (The process for incorporating and adopting Lighting Global SHS methodologies within the IEC framework is underway.)

Quality Standards include:

- Truth-in-Advertising: Accurate consumer-facing labelling
- Lumen Maintenance: L85 time is greater than 2,000 hours.
- Battery: Must be durable and adequately protected.
- Health and Safety: Batteries may not contain mercury or cadmium, products are safe.
- Durability and Quality: Appropriate protection to prevent early failure.
- Warranty: Consumer-facing with at least one year of coverage.
- Performance Information: Run time and brightness reported along with a note about the impact of mobile phone charging

**Why seek Lighting Global Certification?**

An increasing number of governments, donors, investors, tenders, NGOs and projects require PicoPV products and plug and play SHS kits to have passed the Lighting Global quality standards in order for them to be supported, included in a program of activity or funding. Certification is also a key eligibility criteria for companies seeking to become a Lighting Global associate and benefit from its advisory services and market catalyzing programmes across Africa and Asia.

**Lighting Global Test Options**

While there are a number of Lighting Global test options available (See table 1), all of which differ in scope, fees and the time they take to complete, any new product, from a manufacturer new to the framework will ultimately require full QTM tests to be carried out.

Once a product has passed the test, it is included on the Lighting Global website of approved products. The approval is valid for 2 years after which approval can be renewed. Products which do not pass the QTM test, receive full results and feedback. Manufacturers can reapply, going through targeted retesting of the relevant parts which failed previously, the cost of which is generally less than the cost of a full QTM test.

A step by step guide to product testing is provided on the Lighting Global website [here](#).

**How to get started (Who to contact and who is involved)**

In order to get a new product tested through the Lighting Global QA framework, you need to:

1. Contact Lighting Global (Email: testing@lightingglobal.org)
2. Decide which test you need (QTM is the full test)
3. Select and agree a contract with a test laboratory (See table 2)
4. Sign contracts with Lighting Global and Test Lab
5. Await results
Which tests need to be taken?

For products to be published and remain on the Lighting Global website as approved products, they ultimately need to have passed the full QTM test or the ‘Family of Products’ test which includes QTM testing.

Associate members, with a strong track record of engagement with Lighting Global, may be eligible to use Accelerated Verification Methods (AVM) for products to be included on the approved product list, after which it must pass a QTM test. Products included on the approved product list are subject to random market check tests (MCM). In the case of products which have gone through the AVM route, MCM tests are mandatory and paid for by the applicant.

An optional Initial Screening Method (ISM) is a faster test for companies which are interested in receiving feedback to help them prepare for a full test. Table 1 outlines the scope as well as the indicative timing and fees for each test. Products which pass the full tests are published as approved product on Lighting Global website (valid for 2 years). Passing this test is one of the eligibility criteria for applying for associate status with Lighting Global.
Table 1 below outlines the scope of each test and how long they typically take:

Quality Test Method (QTM) - Full tests:

- Full test for preconfigured products. Pass required for certification
- 18 products 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
- Results valid for 2 years (Product published on approved product list)
- Product may also be subject to Market Check Testing (MCM) during 2-year period
- Timeline: Approx 16 weeks. (Some members have reported longer)

Initial Screening Method (ISM):

- An abbreviated version of the QTM that is designed to offer a low-cost assessment of a new product’s likelihood of passing the full QTM. Products still require full QTM test.
- 3 product units are selected by companies themselves and are provided for screening.
- A sample size of 1 is used for each test
- Timeline: Approx 6 weeks.

The Market Check Method (MCM)

- All products which pass lab tests may be subject to market check testing to ensure that they continue to provide the same level of quality and performance. Samples for market check testing are collected from retail locations without prior notice and tested by qualified labs.
- MCM is mandatory, and paid for by the manufacturer, for products going through the AVM route.
- Designed for situations where only partial testing is required but with rigor equal to the QTM.
- Also used when a product is changed and its standardized specifications sheet needs updating.

Accelerated Verification Method (AVM)

- An optional, faster, alternative to QTM to get your product approved
- Only open to Lighting Global Associates. Additional eligibility criteria apply.
- 7 products submitted (Not randomly selected from samples)
- Followed by mandatory QTM and MCM tests (Additional fees)
- Note: This route includes penalties (financial and non-financial) for products which fail
- Timeline: Approx 10 weeks (Followed by QTM and MCM)

‘Family of Products’ (Framework for Testing Product Component Families)

- This is intended for products that are sold as individual components or as “mix-and-match” kits in which some or all of the components within the product family may be used interchangeably.
- Custom test plan developed for each product family.
- Timeline and pricing varies according to a pre-agreed test plan

Renewal

- Renewal testing is conducted to renew a product’s QTM Test results and maintain its program status 2 years after the Standardized Specification Sheet and Verification Letter were issued.
- Products that have not changed may be renewed using a 2 sample ISM Test (note that the product samples for these tests must be collected by an agent of Lighting Global as per sample collection procedures)
- Results are valid for an additional 2 years
- Products which have been updated may require full QTM testing.

You can visit the Lighting Global website. More information on the above tests or contact GOGLA’s QA team.
Accredited Laboratories

There are an increasing number of accredited labs which can be used to run Lighting Global QA tests. The Schatz Energy and Research Centre (SERC) has been playing a coordinating role and has led the development of the Lighting Global standards. Only SERC and SMQ (China) have the accreditation and capability to run all the tests.

Table 2 below includes contact details and summarises the key capabilities of each lab. It is important to note that not all labs can run all tests and not all labs have all the accreditations required by some countries. In the case of PicoPV products, it is recommended that these are tested by labs with ISO 17025 accreditation as some countries include this as a requirement.

### Table 2 Lighting Global affiliated laboratories

<table>
<thead>
<tr>
<th>Test Lab</th>
<th>Contact</th>
<th>ISO 17025 Accredited</th>
<th>Test Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERC, USA</td>
<td><a href="http://www.schatzlab.org">www.schatzlab.org</a></td>
<td>✓</td>
<td>ALL</td>
</tr>
<tr>
<td>Teri, India</td>
<td><a href="http://www.teriin.org">www.teriin.org</a></td>
<td>✓</td>
<td>ISM, MCM</td>
</tr>
<tr>
<td>University of Nairobi, Kenya</td>
<td><a href="http://nuclear-sciences.uonbi.ac.ke/node/243">http://nuclear-sciences.uonbi.ac.ke/node/243</a></td>
<td>(Not yet)</td>
<td>ISM, MCM</td>
</tr>
</tbody>
</table>


3. National programmes and standards

While IEC standards have been adopted in over 100 countries and Lighting Global standards are becoming increasingly relevant in multiple countries, this does not mean there is universal adoption of harmonised standards across the world. While some countries adopt international standards in their entirety, others simply use international standards as a basis for local standards and introduce local amendments and requirements. National standards are typically under the jurisdiction of a national standards agency, such as the Kenyan Bureau of standards (KEBS).

In some countries, such as in Cambodia, programmes include international standards as one of a series of ‘steps’ which need to be met in order to gain local accreditation. It is important to note, however, that countries, programmes and institutions are continually updating their QA requirements and it is important to check the latest situation for each referenced.

Recognising that this is an ever changing picture, an online table [See here](https://www.lightingglobal.org/qa/test-laboratory-network/) has been created by Lighting Global as a live, working document, which provides an overview of country standards relevant to the off-grid solar sector. This is a new common resource available for members to reference and update. Information within should be cross checked with the relevant country to ensure it remains accurate. Additional country specific background information is provided in Appendix 1 for the following countries: Cambodia (Good Solar Initiative); Bangladesh (IDCOL)

It is also important to note that many countries have implemented guidelines which require products to go through Pre-Export Verification of Conformity (PVoC) process prior to being exported into that market.
4. Pre-Export Verification of Conformity (PVoC)

PVoC is a procedure in place across a number of countries, such as Kenya and Tanzania, which requires companies exporting products into these markets to apply for a Certificate of Conformity (CoC) prior to shipping. A CoC is issued following an inspection against national standards (e.g. quality; health and safety). Companies can apply for CoCs from authorized PVoC Agents such as: SGS; Intertek; Bureau Veritas and China Certification and Inspection Group (CCIC). Companies should check on a country by country basis, who the authorised agents are. It is also important to check whether a CoC is required before bringing goods into any given market so as to avoid delays and other penalties.

5. GOGLA and Quality Assurance

Recognising the importance of QA, GOGLA has established a dedicated QA team which:

- Manages a working group of industry members which is a forum for industry action and opinion
- Can provide members with advice when navigating QA processes
- Can support members when they are confronted with bottlenecks in the QA process
- Provides industry feedback to change standards and improve testing procedures
- Engages with governments and organisations on behalf of members

GOGLA has also agreed to sit on the Lighting Global steering committee, which will be responsible for guiding the future development and service of the standard and certification body.

You can contact GOGLA’s Program Manager responsible for Quality Assurance at: j.keane@gogla.org
Appendix 1

National Initiatives

Cambodia

The ‘Good Solar Initiative’

The “Good Solar Initiative” is an accreditation and quality control scheme for solar companies, their products and services in Cambodia, which includes a consumer facing certification seal. The scheme was established by SNV under the framework of the AFD/EU funded “Green Microfinance Program.”

Scope

The QA framework covers standards and regulations for a wide range of solar systems and products:

- PicoPV products/kits (Based on Lighting Global and IEC-TS 62257-9-5)
- SHS components (International ISO/IEC standards submitted by manufacturers)
- Key System Design Standards (Performance, Safety, Warranty, Installation)
- Sales Services Regulations:
  - Pre-Sales incl. promotion, information and quotation;
  - Sales incl. purchase, installation and training;
  - After-Sales incl. warranties, manuals, support, troubleshooting and training

Accredited solar companies commit to promoting only high quality solar products and to providing customer care services and agree to undergo quality inspection to confirm their compliance. This builds trust amongst consumers, and the “Good Solar Initiative” certification seal becomes a recognized symbol for quality.

For more information, you can visit www.goodsolarinitiative.org

You can also download the: Quality Charter Technical & Service Quality Standards for Accredited Solar Suppliers

Contact details:

Good Solar Initiative
c/o SNV Netherlands Development Organisation (Cambodia)
POC Building, 2nd floor
#184, Street 217 (Monireth Blvd.)
Phnom Penh, Cambodia
+855 23 994 562
info@goodsolarinitiative.org
Bangladesh

IDCOL (Infrastructure Development Company Limited)

What is IDCOL?

IDCOL is a Bangladeshi Government-owned financial institution that is implementing a large-scale solar home system (SHS) and PicoPV programme in Bangladesh. Loans and grants are provided by IDCOL to Partner Organizations (app. 50 POs), such as NGOs and private sector companies, that identify customers, provide micro-credit, install the SHS where appropriate, and provide after-sales service.

IDCOL projects that by 2017 it is likely to have invested a billion dollars cumulatively, and it has a target of financing 6 million SHS. It is the market leader in private sector energy and infrastructure financing in Bangladesh.

How to join the IDCOL SHS & PicoPV programme

To become part of the programme, a supplier of PicoPV or SHS must submit applications with all relevant documents to contact@idcol.org

SHS must meet the standards as set out in the Technical Specifications for Solar Home System (SHS), whereas PicoPV products must be Lighting Global approved.

In order to qualify for inclusion in the programme, applications must be made to IDCOL, which provides a document checklist for both PicoPV and SHS here: http://idcol.org/home/downloads/solar

Once approved, companies are included on the publicly available ‘Approved supplier list’ which provides the contact details of all suppliers engaged with the program.

Additional information

- IDCOL Resources for downloading (Application checklists; Approved supplier list; Technical Specifications for SHS)

References

www.goodsolarinitiative.org
www.idcol.org
www.intertek.com
www.iec.org
www.kebs.co.ke
www.lightingglobal.org
www.sgs.com