



# Draft Interim Quality Assurance Framework for Component-Based Solar Home Systems

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## Abbreviations

A	Amps (or Ampere)
a.c.	Alternating Current
Ah	Amp Hours
CSF	Credit Support Facility
d.c.	Direct Current
DIT	Directorate Industrial Training
DWD	Directorate of Water Development
ERA	Electricity Regulatory Authority
ERT	Energy for Rural Transformation
ESP	Electric Service Providers
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GoU	Government of Uganda
GPOBA	Global Partnership on Output Based Aid
GSES	Global Sustainable Energy Solutions
HH	Households
ICT	Information and Communication Technologies
IEA	International Energy Agency's
IsDB	Islamic Development Bank
JICA	Japan International Cooperation Agency
kW	Kilo Watts
LV	Low Voltage
MEMD	Ministry of Energy and Mineral Development
MPPT	Maximum Power Point Tracker
NEP	National Energy Policy
NEMA	National Environment Management Agency
NORAD	Norwegian Agency for Development Cooperation
PCU	Project Coordination Unit
PFI	Participating Financial Institutions
PSFU	Private Sector Foundation Uganda
PSH	Peak Sun-Hours
PWM	Pulse Width Modulated
REA	Rural Electrification Authority
RESP	Rural Electrification Strategy Plan
SHS	Solar Home System
UECCC	Uganda Energy Credit Capitalisation Company
UEDCL	Uganda Electricity Distribution Company Ltd
UEGCL	Uganda Electricity Generation Company Ltd
UIA	Uganda Investment Authority
UMA	Uganda Manufacturers Association
UNBS	Uganda National Bureau of Standards
UNREEEA	Uganda National Renewable Energy and Energy Efficiency Alliance
UREA	Uganda Renewable Energy Association
USEA	Uganda Solar Energy Association
V	Volt
VA	Volt Amps

W	Watts
Wh	Watt Hours
W <sub>p</sub>	Watts Peak

## Definitions

Applying Company:	Company applying to be eligible for loans through the Working Capital Facility
Approved Company:	Company approved in accordance with the requirements of this Interim Quality Assurance Framework to apply for loans through the Working Capital Facility

## 1 Introduction

This is the Interim Quality Assurance Framework to be met by a business operating in Uganda to become an Approved Company eligible to provide component-based solar home systems under the Uganda Energy Credit Capitalisation Company (UECCC) line of credit and guarantee facility to promote the deployment of quality-verified off-grid solar systems.

A component based solar home system is a system (as shown in Figure 1) where the individual components: solar module; solar array frame; solar controller; battery; inverter (optional) and all balance of system equipment (cables, switches, protection devices) are all sourced as individual products and a company typically arranges the installation of the system for a client. Plug and Play solar home systems, which is not covered by this framework, are those where the company sells a complete system to a client which can be self-installed by the client.

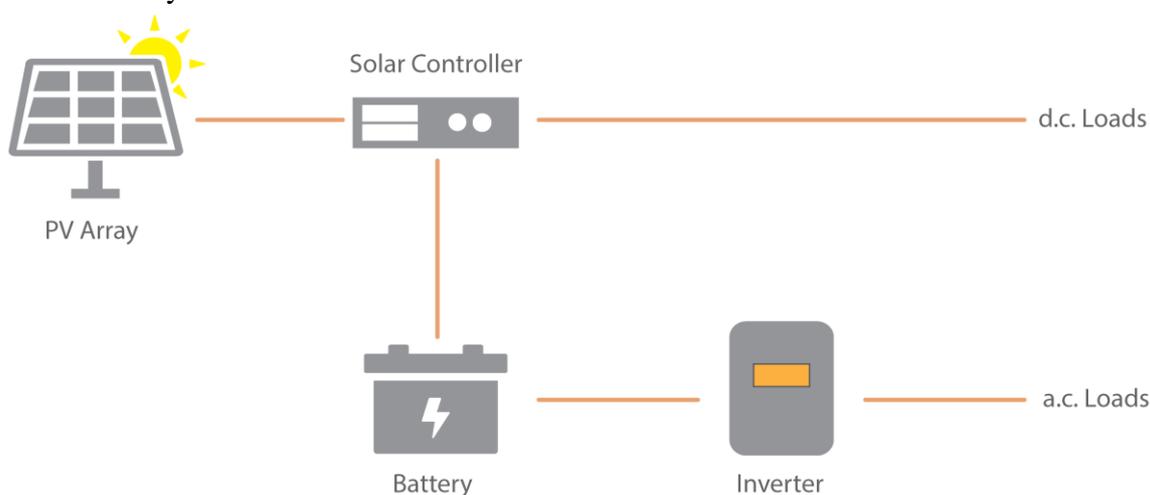


Figure 1: Example of a simple component based solar home system

The Interim Quality Assurance Framework is applicable for component-based solar home systems with a maximum solar array of  $1\text{kW}_p$ .

*Note: The Interim Quality Assurance Framework is targeting components to be bought through the working capital fund to be installed in component based solar home systems up to  $1000\text{W}_p$  (array rating). It is appreciated that some of the components purchased through the working capital fund might be used in larger systems in schools or clinics. If so, these must be listed in the reports provided by the Approved company to the financial institution, and the design and installation shall still follow the design and installation guidelines that have been developed.*

This document includes the

- company requirements;
- products standards;
- installer requirements;

- process and application for a company to apply to become an approved company and to have their products and installers approved; and
- complaints and sanctioning procedures.

The complete Interim Quality Assurance Framework includes two guidelines that must be followed when designing and installing the solar home systems. These guidelines are titled:

- Solar Home System- Design Guideline
- Solar Home System- Installation Guideline

## 2 Company Requirements

This section details the criteria to be met by a business operating in Uganda to become an Approved Company eligible to provide component-based solar home systems under the Uganda Energy Credit Capitalisation Company (UECCC) line of credit and guarantee facility to promote the deployment of quality-verified off-grid solar systems.

Section 8 describes the process required for an Applying Company to be technically approved to apply to UECCC for loans through the Working Capital Facility. This process requires the completion of an application form and this information must provide all the evidence to meet the criteria as detailed in this document.

### 2.1 Business Registration

The Applying Company shall meet the UECCC and the lending institution's business registration requirements when applying for a loan through the Working Capital Facility.

### 2.2 Financial Capacity

The Applying Company shall meet the UECCC and the lending institution's financial requirements when applying for a loan through the Working Capital Facility.

### 2.3 Management Capability

The Applying Company must nominate at least one person who will be the contact person for the UECCC. This person will take responsibility for the company meeting all the requirements specified in this document and be the person formally authorised to answer any questions regarding the application.

The Applying Company shall provide organisational details of their business to show where this person is positioned within the existing management structure and to include the name and position of at least one alternate contact person.

The Applying Company shall include details of any relevant accreditations (e.g. ISO9001 Quality Management), if any, that they hold. Copies of the certificates verifying any accreditation that the company has shall be attached.

An Approved company shall abide by the Customer Service Best Practice Guideline as detailed in section 9

## 2.4 Operation Structure

The company shall provide a description of their operation. This should include:

- Number of staff and the breakdown of how many in management, administrative, sales and technicians;
- Listing all their regional outlets; and
- Information on their complaints procedure (if one exists).

## 3 Company Technical Requirements

### 3.1 Components used in Solar Home Systems

An Approved company shall only use components within their solar home systems:

- that have been tested and certified against the required standards; and
- meet the product performance requirements that are specified in Section 4.

The Applying Company shall provide:

- a list of all the different brands/models of products that they will use as components within their solar home systems;
- provide brochures for the different products and models; and
- provide the test certificates from a testing laboratory accredited to ISO/IEC 17025 **General Requirements for the Competence of Testing and Calibration Laboratories** verifying that the product meets the specified standard.
- Provide if any, agreement/ purchase order/ dealership/ MoU executed with the supplier company
- Standard timeline to supply different products after placement of purchase order
- Product warranty terms
- If imported products evidence/ assurance of custom clearance

Where a manufacturer has a range of different size/rated products then the company can specify the range, however the test certificates provided with the application must specify all the models that meet the standards as specified in Section 4. If the test certificate does not specify a particular model, then that model is not eligible to be included in the solar home system.

If a new model is released by a manufacturer, then that model shall also be specified on a test certificate and the Approved Company must provide that test certificate to UECCC for verification before the product is approved to be used within a solar home system.

### 3.2 Design of Systems

Approved Companies shall design their systems in accordance with the requirements of the “*Solar Home System Design Guideline*” and the existing Uganda Code of Practice: US:152-2000 Installation of Photovoltaic systems. Where this guideline has a requirement that contradicts a similar requirement within the Code of Practice, the requirement of the “*Solar Home System Design Guideline*” shall be followed because this guideline has been based on current best practices.

With the application, the Applying Company shall provide designs of three systems they typically supply. These systems shall have solar arrays in the range from  $10W_p$  to  $1000W_p$ . The purpose of providing these designs is to verify that the systems being designed by the companies are in accordance to the “*Solar Home System Design Guideline*”. Further verification will be undertaken when systems are randomly inspected (see section 3.3).

The design documentation shall include the following details (as a minimum):

- The total daily load energy: a.c. and/or d.c. that the system can supply. For systems that are designed to provide both a.c. and d.c., the design energy for each shall be stated.
- Size or capacity of individual modules ( $W_p$ )
- Open circuit voltage ( $V_{oc}$ ) as per name plate of module
- Number of modules used in the system
- Number of modules connected in series
- Number of series strings in parallel
- The daily irradiation value (Peak Sun Hour) used in the design.
- The type of controller (Maximum Power Point Tracker (MPPT) or standard controller Pulse Width Modulated (PWM) provided with the system.
- The ratings of the controller: maximum current in, maximum current out, voltage in and voltage out and if a MPPT the input voltage range and maximum PV array power.
- The type of battery (e.g. flooded lead acid, valve regulated lead acid, lithium ion etc).
- The battery voltage and battery capacity (in ampere-hours (Ah) or watt-hours (Wh) of the individual batteries (or cells).
- The number of battery (cells) in series and number of parallel strings of batteries
- The total battery bank voltage and battery capacity (in ampere-hours (Ah) or watt-hours (Wh)
- If applicable the inverter rating in VA or kVA;
- The derating factors used when determining the effective output for the array including:
  - Temperature;
  - Dirt; and
  - Manufacturers’ tolerance
- The array oversize factor.
- The days of autonomy used in the design.
- Maximum battery depth of discharge considered in battery sizing.
- The subsystem losses including:
  - Battery efficiency;
  - Cable efficiency (if applicable);
  - MPPT efficiency (if applicable);
  - Inverter efficiency (if applicable).

### 3.3 Installation of Systems

The Approved Company shall install their solar home systems in accordance with the “*Solar Home System Installation Guidelines*” and the existing Uganda Code of Practice: US:152-2000 Installation of Photovoltaic systems. Where this guideline has a requirement that contradicts a similar requirement within the Code of Practice, the requirement of the “*Solar*

*Home System Installation Guideline*” shall be followed because this guideline has been based on current best practices.

As stated in the “*Solar Home System Installation Guidelines*”, a testing and commissioning sheet shall be provided with every system installation. An example of a testing and commissioning sheet is included as an annex to the Installation Guidelines. The information required in the example test and commissioning sheet is the minimum that should be included in any test certificate developed by an Approved Company.

Testing and commissioning sheets shall be provided to UECCC for all systems installed within two months of the Approved Company drawing down on their loan received from UECCC. UECCC will then randomly select systems that will be inspected by the Uganda National Bureau of Standards (UNBS) with the assistance of the REA appointed international consultants. The inspection shall verify that the companies have installed the system in accordance to the requirements of the Uganda Solar Home System Installation Guidelines.

The inspectors shall complete an installation report. This report will document where, if any, the system installation is not compliant with the installation guidelines. If the system has part(s) of the installation that are non-compliant a copy of the report will be sent to the Approved Company. The Approved Company will then have a period of two (2) weeks to respond to the report and state how they intend to rectify the non-compliance(s). If the Approved Company fails to respond or fails to rectify the non-compliances will result in the UECCC implementing the sanctioning procedure as specified in Section 8. This process as described above is shown in the flowchart in Figure 2.

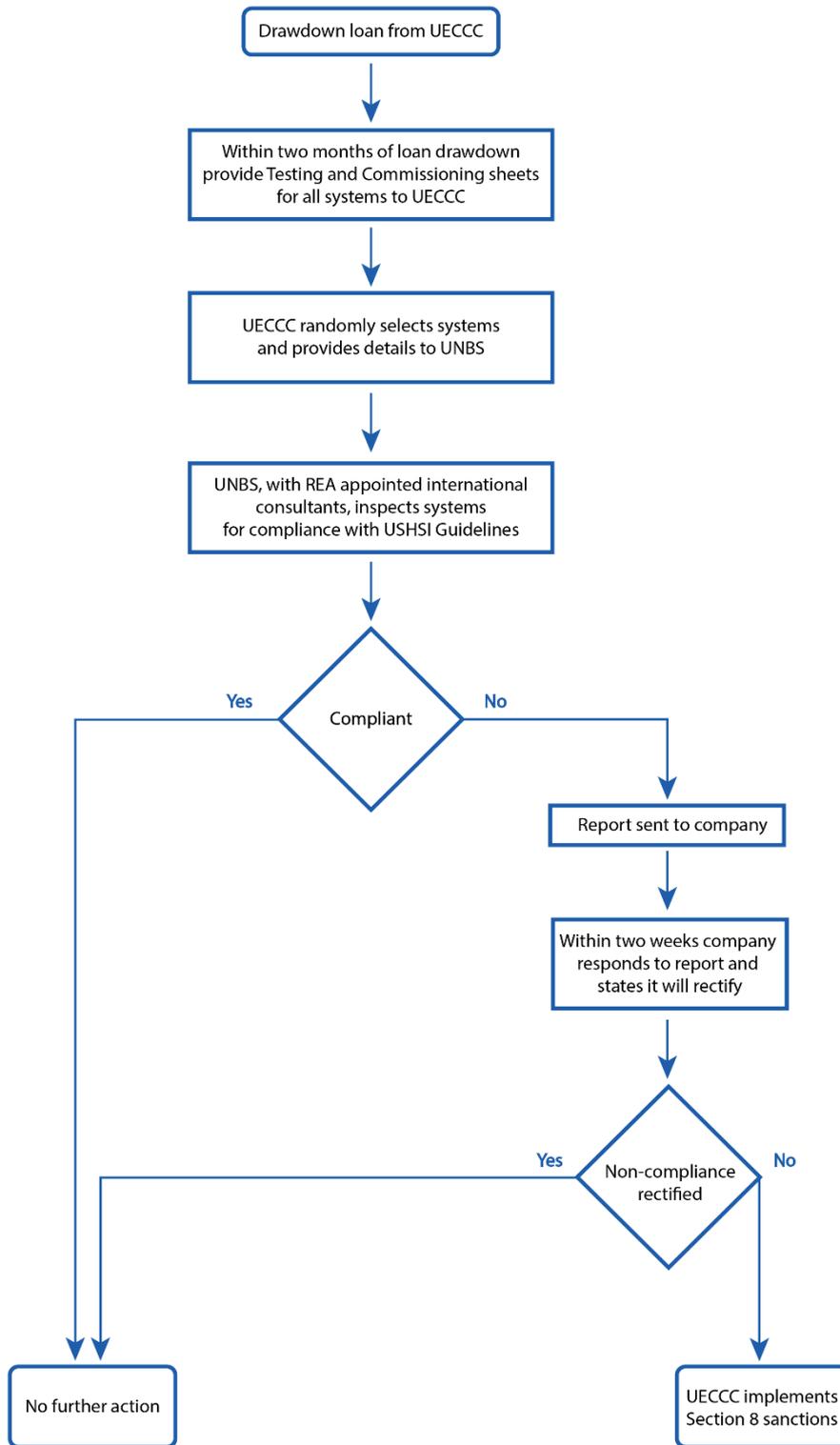


Figure 2: Flow Chart of System Inspection Process

### 3.4 Solar Installer Qualifications

The Approved Company’s installers shall meet the requirements as specified in Section 5.

## 4 Component Standards Requirements

The individual system components to be purchased and used in component-based solar home systems by the companies approved to obtain loans through the Working Capital Facility must comply with the specific component standards listed in this document.

As part of the component approval process, the Applying Company is required to provide test certificates to demonstrate that the major components used in the system complies with the relevant specified standards.

The pre-verification of conformity (PVoC) will be acceptable in lieu of any test certificate for those components where Uganda through the UNBS has adopted the required set of standards as listed in this section for the various components

### 4.1 Component (Equipment) Standards (Informative)

Quality system components in the solar energy industry are typically tested and certified against standards developed by the International Electrotechnical Commission (IEC), Underwriters Laboratory (UL), or, in some cases, European Standards (EN). Many products such as solar modules, batteries, inverters, and controllers are tested and certified to one or more sets of standards. For example, some USA-manufactured inverters are tested against the UL standard for the USA versions and also have the CE (Conform European) marking meaning that they conform to European Requirements. As the industry has been progressing very quickly, there are instances when some of the balance of system equipment used in the industry do not have IEC or UL standards available but other standard organisations like European Standards (EN) or specific country standards are developed.

### 4.2 Testing Laboratories

Quality system components in the solar energy industry are typically tested and certified by qualified test laboratories. In the context of this program, testing and verification that the system components have met the relevant standard(s) shall be undertaken by a testing laboratory accredited to ISO/IEC 17025 **General Requirements for the Competence of Testing and Calibration Laboratories**.

The test laboratory shall have ISO 17025 accreditation for the particular standard / test method relevant to the product being tested.

Copies of all the relevant ISO 17025 accreditation certificates and/or other supporting documentation from the test laboratory may be required if there is any doubt by the UNBS and REA consultants regarding the credibility of a specific test laboratory.

### 4.3 Modules

#### 4.3.1 For Solar Home Systems with an array Peak Watt Rating Greater than 100Wp

Solar modules with a peak power rating greater than 100W shall meet either  
The relevant following design qualification and type approval standards

- IEC 61215 Terrestrial photovoltaic (PV) modules - Design qualification and type approval
  - IEC 61215-1 Part 1: Test requirements

- IEC 61215-1-1 Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules
- IEC 61215-1-2 Part 1-2: Special requirements for testing of thin-film Cadmium Telluride (CdTe) based photovoltaic (PV) modules
- IEC 61215-1-3 Part 1-3: Special requirements for testing of thin-film amorphous silicon based photovoltaic (PV) modules
- IEC 61215-1-4 Part 1-4: Special requirements for testing of thin-film Cu(In,GA) (S,Se)<sub>2</sub> based photovoltaic (PV) modules
- IEC 61215-2 Part 2: Test Procedures

and

- IEC 61730 Photovoltaic (PV) module safety qualification
  - IEC61730-1 Part 1: Requirements for construction
  - IEC61730-2 Part 2: Requirements for testing

or

- UL Standard 1701: Flat Plat Photovoltaic Modules and Panels

Modules with IEC certification that will be installed in systems where the temperature adjusted open circuit voltage of the array is greater than 50V d.c. must be certified as Application Class II per IEC 61730

Modules with IEC certification that will be installed in systems where the temperature adjusted open circuit voltage of the array is equal to or less than 35V d.c. can be either certified as Application Class II per IEC 61730 or Application Class III per IEC 61730.

Each module shall be marked with a serial number with the purpose of providing traceability to the manufacturer's name, factory and date of manufacture.

The module label must show the correct Certifier Mark (logo) corresponding to that on the test certificate supplied at the time of approval.

If the certificate on which the listing was based becomes invalid, then the Approved Company must supply a new certificate for the module or cease purchasing that module with loans provided under the Working Capital Facility.

If a Ugandan company wishes to sell modules that are manufactured by an international module manufacturer but are supplied with the company's own company name or a specified brand name, then the Applying Company must obtain an IEC test certificate I from the international manufacturer which lists the Ugandan company's name and model numbers.

#### 4.3.2 For Solar Home Systems with an Array Peak Watt Rating Equal to or less than 100Wp with an Array Open Circuit Voltage less than 35V d.c.

Modules that are not tested and certified in accordance with the IEC and UL standards specified in section 4.3.1 will be accepted if they have been tested in accordance with the solar module test requirements specified in:

- IEC TS 62257-9-5:2018: Recommendations for renewable energy and hybrid systems for rural electrification - Part 9-5: Integrated systems - Laboratory evaluation of stand-alone renewable energy products for rural electrification.

The test results must indicate that the solar module meets the relevant requirements specified in the Lighting Global SHS Kit Quality Standards (available at <https://www.lightingglobal.org/quality-assurance-program/our-standards/>).

#### 4.4 Batteries

##### 4.4.1 Lead Acid Battery Banks with energy rating greater than 1,000 watt-hours (Wh) at C<sub>10</sub>

Lead acid batteries used in a battery bank with an energy rating greater than 1,000Wh (C<sub>10</sub>) shall meet one of the following standards:

- IEC 61427 Secondary Cells and Batteries for Solar Photovoltaic Energy Systems - General Requirements and Methods of Test
- IEC 60896 Stationary lead-acid batteries (series)
- UL 1973 Standard for Batteries for Use in Light Electric Rail (LER) Applications and Stationary Applications
- UL 1989 Standby Batteries

or

- A safety standard submitted by an Applying Company that is approved by consensus between UNBS and the REA and World Bank consultants.

Batteries that meet one of the above UL standards should also meet:

- UL-2054 Safety Standard for household and commercial batteries

In addition to meeting the requirements of the above referenced standards lead acid batteries shall:

- have a minimum cycle life of 1100 cycles down to 50% depth of discharge; and
- be marked with a serial number with the purpose of providing traceability to the manufacturer name, factory and date of manufacture.

Note: End of life is defined when the battery can only retain 80% of its original capacity.

##### 4.4.2 Lead Acid Battery Banks with energy rating of 1,000 Watt-hours (Wh) or less at C<sub>10</sub>

Batteries that are not tested and certified in accordance with the IEC and UL standards specified in section 4.4.1 will be accepted if they have:

- Cycle life greater than 1100 cycles down to 50% depth of discharge
- or
- been tested in accordance with the battery durability tests specified in:
    - IEC TS 62257-9-5:2018: Recommendations for renewable energy and hybrid systems for rural electrification - Part 9-5: Integrated systems - Laboratory evaluation of stand-alone renewable energy products for rural electrification.

- The test results must indicate that the battery meets the relevant requirements specified in the Lighting Global SHS Kit Quality Standards (available at <https://www.lightingglobal.org/quality-assurance-program/our-standards/>).

#### 4.4.3 Lithium Ion Battery Bank for stationary applications

The individual cells and the assembled battery pack for lithium-ion batteries included in a system battery bank designed for a stationary application shall meet either:

- IEC 62619 Secondary cells and batteries containing alkaline or other non-acid electrolytes— Safety requirements for secondary lithium cells and batteries, for use in industrial applications

or

- UL 1642 Standard for Lithium Batteries; and
- UL-2054 Safety Standard for household and commercial batteries

or

- A safety standard submitted by an Applying Company that is approved by consensus between UNBS and the REA and World Bank consultants.

In addition to meeting the requirements of the above referenced standards, lithium-ion batteries shall be:

- supplied with a manufacturer's approved Battery Management System (BMS); and
- marked with a serial number with the purpose of providing traceability to the manufacturer name, factory and date of manufacture

#### 4.4.4 Lithium-ion Battery Banks for portable applications

The individual cells and the assembled battery pack for lithium-ion batteries included in a system battery bank for systems designed to be portable (i.e. easily hand carried) shall meet either the requirements as per 4.4.3 or:

- IEC 62133-2 Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems.

and/or

- UN 38.3 United Nations Manual of Tests and Criteria: Lithium Battery Testing Requirements

## 4.5 Solar Controllers

The controllers shall either meet one of the standards listed below or one of the markings listed below.

Standards include:

- IEC 62109 Safety of power converters for use in photovoltaic power systems
  - IEC 62109-1 Part 1: General requirements
- IEC60335-1 and IEC60335-2-29

- UL Standard 1741: Standard for Inverter, converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources
- or
- A safety standard submitted by an Applying Company that is approved by consensus between UNBS and the REA and World Bank consultants.

Markings include:

- Underwriters Laboratory (UL) Listing and Classification Mark
- Conformity European (CE) marking

In addition to meeting the requirements of the above referenced standards, each controller shall be marked with a serial number with the purpose of providing traceability to the manufacturer name, factory and date of manufacture.

## 4.6 Inverters

The inverters shall meet one of the following standards:

- IEC 62109 Safety of power converters for use in photovoltaic power systems
    - IEC 62109-1 Part 1: General requirements
    - IEC 62109-2 Part 2: Particular requirements for inverters
  - UL Standard 1741: Standard for Inverter, converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources
- or
- A safety standard submitted by an Applying Company that is approved by consensus between UNBS and the REA and World Bank consultants.

Note: Some inverters manufactured in accordance with the UL standards will have the CE mark for their European (230V, 50Hz) models.

The inverters shall be rated to provide an a.c. voltage within the range of 220V and 240V. If supplied with a socket outlet it should be the British standard outlet.

In addition to meeting the requirements of the above referenced standards, each inverter shall be marked with a serial number with the purpose of providing traceability to the manufacturer name, factory and date of manufacture.

## 5 Warranty

The minimum warranty acceptable is 2 years on the complete system installation and on each of the individual components.

The photovoltaic modules shall be warranted to provide their rated output at standard conditions within  $\pm 10\%$  for a minimum of 10 years under the operating conditions at the sites. The modules shall be warranted against physical defects for a period of at least 5 years following installation

The battery, solar controller (PWM or MPPT) and inverter shall each have a minimum 2 years' warranty.

The responsibility to carry and honour these warranty provisions is borne by the Approved Company and applies even if the product manufacturer fails to honour the warranty and/or the company manufacturing the product no longer exists.

## 6 Installer Requirements

The Approved Company's employed or sub-contracted installers responsible for the installation of component-based solar home systems sold and supplied by the companies approved to obtain loans through the Working Capital Facility must comply with the requirements listed in this section.

Due to the need for the Working Capital Facility to be launched as soon as possible, and that the Working Capital Facility will finish in December 2020, the interim requirements listed in this section are for those installers working with companies that are applying for loans. The requirements listed here will be replaced by the requirements of the long-term Quality Assurance Framework. However, some of the requirements identified in this section as "pathways" for being an approved installer might be included within the long term framework.

### 6.1 Number of Installers per Company

Some of the companies have a large number of installers while smaller companies might only have a few installers.

For this interim quality assurance framework, it would be unfeasible to expect that all the installers will meet the requirements specified in this document. Also, it would be impossible to assess every single installer. However, whether the installer is approved or not under the requirements of this document, it will be the installer's responsibility to install a component-based solar home system in compliance with all the requirements of the Solar Home System Installation Guidelines. The Approved Company will be held responsible if the system installation does not meet those guidelines.

Three installers from each Applying Company will be assessed by the REA consultants. A Minimum of two from each Applying Company must pass the assessment and be approved as installers under the interim quality assurance framework.

### 6.2 Installer Qualification and Experience Requirements

To be an approved installer under the interim qualifications framework the installer shall meet one of the following pathways:

**Pathway 1.** Be an Experienced Installer who has

- Been a solar home system installer for a minimum of two years;
- Undertaken in-house training or attended a third-party training course(s) on solar home system design and installation; and
- completed and achieved a pass mark of 75% in a written multiple choice assessment based on the Solar Home System Installation guidelines.

or

**Pathway 2:** Z Class Permit Holder who

- Holds the Solar Technician Z Class Permit provided by the Electricity Regulatory Authority; and
- Completed and achieved a pass mark of 75% in a written multiple choice assessment based on the Solar Home System Installation guidelines.

or

**Pathway 3.** Be a trained installer who has

- Undertaken and passed a solar course conducted by any training centre within Uganda. The solar course shall meet the requirements of the “Assessment and Training Package for Solar Photovoltaic Electrician” that was developed by the Directorate of Industrial Training in conjunction with the Nakawa Vocational Training Institute under Business, Technical, Vocational Education and Training (BTJET) programme under the Ministry of Education and Sports.

or

- Undertaken and passed an internationally recognised course

and

- Completed and achieved a pass mark of 75% in a written multiple choice assessment based on the Solar Home System Installation guidelines.

It is proposed that meeting pathways 2 or 3 will be the only requirements for the long-term quality assurance framework, however due to the short time involved in launching the interim quality assurance framework, many experienced installers might not meet either of those two requirements.

The multiple-choice assessment will be conducted in September or October 2019 following a workshop based on the installation guideline. If the installer fails, the multiple-choice assessment on the first attempt they will be eligible to sit a second assessment.

### 6.3 Information to be provided

Each potentially approved installer shall submit an application based on one of the three pathways. The application forms are contained in section 10 and are part of the overall company application. Once the application has been assessed, the potentially approved installer will be eligible to undertake the multiple-choice assessment. The information that must be provided with the application for the various pathways are detailed in this section.

#### 6.3.1 Experienced Installer

An experienced installer applying to be approved installer under the interim quality assurance framework shall provide the following information:

- A letter from the Applying company, on company letterhead stating when the installer started working for the company as an installer;
- How many (approximately) component-based solar home systems they have installed and the range of sizes.
- A list of all the courses they have attended including copies of any certificates they have received
- Information on three different sized systems they have installed including a wiring diagram showing the relevant information as specified below. If available, include photos of some of the installations. If only installed less than 3 different sizes, then provide a statement stating this and provide information on the system sizes installed. For each system size specify:
  - Size of array in  $W_p$ .
  - Size of individual solar modules installed in  $W_p$ .
  - Number of modules and whether they have been wired in series and parallel.
  - d.c. Voltage of the system (i.e. battery bank voltage)

- Capacity of the battery bank in Ah
- Voltage and Ah capacity of the individual batteries installed.
- Number of batteries and whether they have been wired in series and parallel
- Type (PWM or MPPT) of solar controller used.
- Rating of the Solar Controller include Voltage In, Voltage out, Current in and Current out or in case of MPPT wattage rating.
- Whether an inverter was installed and if so what was the VA rating.
- Whether protection devices (fuses or circuit breakers) were installed and specify where. If only in controller specify that.
- Whether isolators or switches have been installed and specify where.

### 6.3.2 Installer with a Z Permit

An installer with a Z permit applying to be approved installer under the interim quality assurance framework shall provide a copy of the Z permit and, if not stated on the Z permit, the date they obtained the Z permit.

### 6.3.3 Formally Trained Installer

An installer who has been formally trained and is applying to be an approved installer under the interim quality assurance framework shall provide the following:

- Name of the course
- Year course completed
- Name of training centre where course was completed.
- Location of Training Centre
- Website of training centre
- Evidence that the course meets the Assessment and Training Package for Solar Photovoltaic Electrician” and that the training centre has approval to offer the course.
- If it is an internationally recognised course, provide information on the course including:
  - Course Overview
  - Length of course
  - What assessments were undertaken
  - Your assessment mark
  - What third party accreditation the training centre has
- Copy of the certificate verifying the successfully completion the course

## 7 Company, Product and Installer Approval Process

### 7.1 Application Process

A company applying to be eligible to apply for loans under the UECCC Working Capital Facility shall complete the Company Application Form provided in Section 10. This form is divided into 4 parts:

- Part 1: General Information
- Part 2: Component Documentation
- Part 3: Systems Designs
- Part 4: Installer Information

All the information requested in this form must be provided with the application

The form is provided as a Word document and an applicant must submit the application in the same order as shown on the form and must respond to all questions in each section.

Part 1: shall be completed and provided either as a separate document or included in the first pages of a submission document that includes all the evidence and documents requested in Parts 1 through to 4

Part 2: Requires the list of all the components being used in the Applying Company's solar home system; the test certificates required to prove that they meet the required standards and a statement on the warranty of the components.

Part 3: Requires three system designs as detailed in section 3.2

Part 4: Requires information on the Applying Company's installers as detailed in section 6.3.

The application shall be submitted electronically. The electronic version can either be provided on a memory stick or via email.

The application shall be submitted to:

Managing Director  
Uganda Energy Credit Capitalisation Company (UECCC)  
e-mail: [sndagire@ueccc.or.ug](mailto:sndagire@ueccc.or.ug) or [info@ueccc.or.ug](mailto:info@ueccc.or.ug)  
Tel: (+256) 312-165650  
Fax: (+256) 312-202220  
P. O. Box 29725,  
Kampala  
Uganda

The applications will be processed by Transaction Execution Specialists:  
Mr Omony Cyrus Odongkara (e-mail: [comony@ueccc.or.ug](mailto:comony@ueccc.or.ug))  
and  
Mr. Elisha Lugoloobi (e-mail: [elugoloobi@ueccc.or.ug](mailto:elugoloobi@ueccc.or.ug))

## 7.2 Processing by UECCC and REA Consultants

Once an application by an Applying Company to be technically approved for eligibility to apply for loans has been received, the UECCC shall provide the application to the REA Consultants within 2 working days of receiving the application. The REA consultants will complete the verification checklist as provided in Section 10 and will send the forms to UNBS for their review and consideration. Once UNBS has reviewed the checklist it will be forwarded to UECCC. The verification process involves:

1. Confirming that the application form is complete
2. Confirming that all the components: solar modules, batteries, solar controllers and inverters meet requirements.
3. Confirming that the Applying Company is able to design systems in accordance with the design guidelines.
4. Confirming that the installers meets one of the three eligibility requirements
5. Confirming the Applying Company's contact person has been specified.
6. Confirming that the Applying company has provided information on their operation.

Each review will take between 1 to 2 days to process. Subject to the number of applications submitted the REA consultants shall undertake the review and submit the verification checklist within 5 to 10 working days after receiving a completed application.

The checklist includes an area for stating why a company was not yet eligible and what needs to be done to rectify the situation.

The company can be approved prior to their installers completing the multiple-choice examination (refer to Section 6.2) but will not be eligible for any loan drawdown until two of their installers have successfully passed the exam.

#### 7.2.1 Processing of the Installer Application by UECCC and REA Consultants

With respect to the Applying (or Approved) Company's installers, the UECCC can then inform the Applying (or Approved) Company what installers are approved to undertake the multi-choice assessment that will be conducted in September or October 2019. The checklist includes an area for stating why an applicant was not yet eligible to attend the assessment and what needs to be done to rectify the situation.

After the multiple-choice assessment has been completed the REA consultants shall mark the assessments and provide a mark out of 100 for each of the applicants to the UECCC. Those who receive a mark of at least 75% will be eligible to be an approved installer.

Those who obtain a mark less than 75% will be eligible to undertake another assessment that will be conducted by the REA local consultant in liaison with the UNBS within one month of the first assessment being conducted.

Those who receive a mark of at least 75% will be eligible to be an approved installer. The REA consultants in consultation with REA, UECCC and UNBS will decide what happens with those who failed the assessment a second time. The outcome will possibly depend on the actual results obtained in the two assessments.

## 8 Sanctioning Procedure

Section 2 describes the inspection process. The procedure detailed is to be followed when an inspection report has been sent to an Approved Company and they either fail to respond or fail to rectify the non-compliance.

- If the Approved Company fails to respond to the inspection report after the two weeks, the UECCC shall attempt to contact the Approved Company by phone and/or electronically to determine why there has not been a response.
- If, after contact has been made with the Approved Company and the Approved Company still fails to respond within two weeks of being contacted/notified then the UECCC should remove or suspend the Approved Company status such that the company is not eligible for any more loans and stop any existing loan applications that have not been drawn down until the Approved Company responds to the non-compliance and the full non-compliance rectification process is completed.

- If the Approved Company does respond and the system has been rectified to the satisfaction of the UECCC inspector then no further action is required.
- If the Approved Company does respond and has not rectified the non-compliance to the satisfaction of the UECCC, then, until the company has rectified to the satisfaction of the UECCC, the UECCC shall:
  - Suspend the Approved Company status such that the company is not eligible for any more loans; and
  - Stop any existing loan applications that have not been drawn down

The flow chart in Figure 3 summarises the above process.

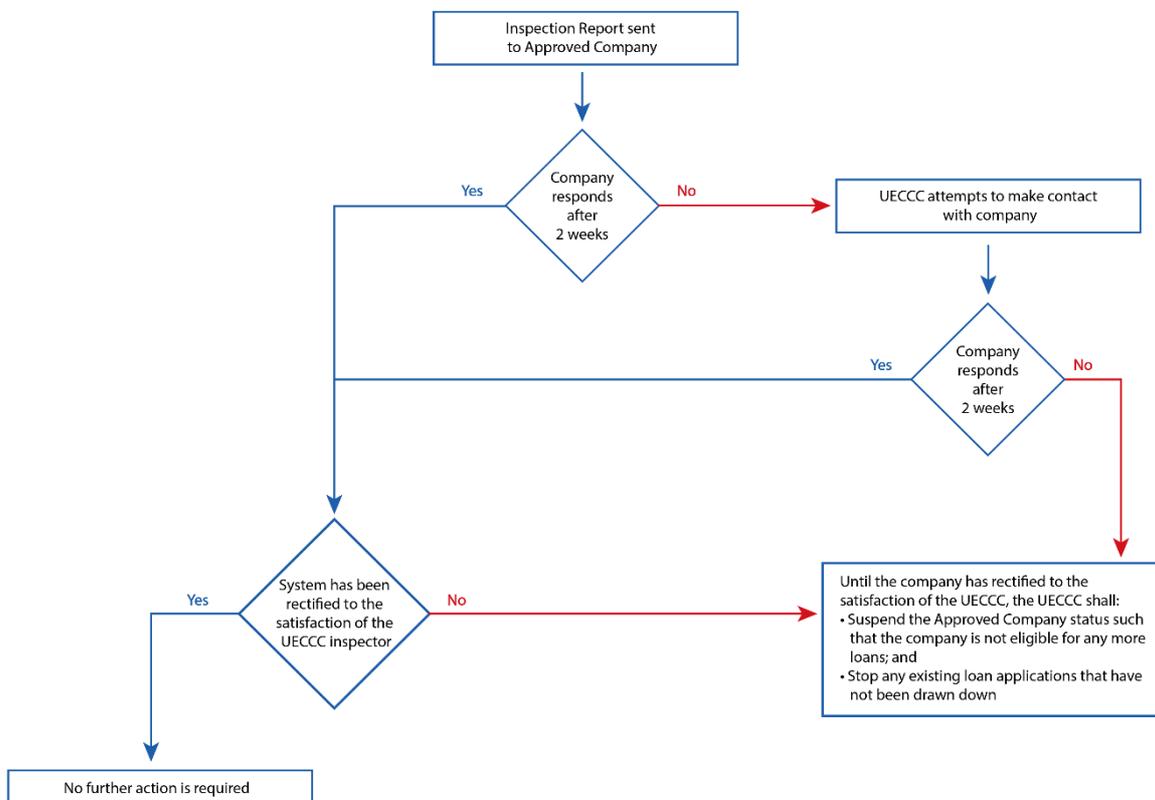


Figure 3: Flow Chart of Sanctioning Process

## 9 Customer Service Best Practice Guideline

The Customer Service Best Practice Guidelines detail the actions, activities and procedures that an Approved Company shall apply to provide customers with quality service. These include:

- a) When a person or company enquires about potential services to be provided, the Approved Company shall respond in a professional manner and as quickly as practically possible.
- b) If a site visit is undertaken, the Approved Company's staff or their installer should undertake a thorough site visit as per the requirements detailed in the System Design Guideline.
- c) When providing a quotation to a potential customer, the Approved Company should provide (as a minimum) the following information:
  - Full specifications of the system equipment being offered including quantity, make (manufacturer) and model number,
  - The relevant warranty information relating to each of the items of equipment,
  - The expected output (daily or yearly) of the system and how it meets the electrical energy requirements of the customer (e.g. a completed load assessment form).
  - Firm quotations which include all equipment, installation and commissioning charges.
- d) When a potential customer agrees to purchase a system from the Approved Company, the Approved Company should have a simple contract for the supply, installation and commissioning of the system. The contract shall be signed by the customer before proceeding. The Approved Company should also sign the contract and each party (Approved Company and customer) keeps a copy of the contract.
- e) When designing a system, the Approved Company's designer shall follow the Solar Home System Design Guidelines.
- f) When installing a system, the Approved Company's installer shall follow the Solar Home System Installation Guidelines.
- g) For system installation, the Approved Company should provide the customer with a minimum of 2 years' warranty on the installation workmanship
- h) An Approved Company should provide support to the customer when a product underperforms or fails under warranty. This support will include liaising with the manufacturer or equipment agent on behalf of the client.
- i) An Approved Company shall keep, as a minimum, the documentation relating to the system installed as specified in the relevant technical guidelines.
- j) If a customer complains to an Approved Customer that the system has failed:
  - i. If the failure occurs within the 2 years' installation workmanship warranty period, the accredited organisation:
    - Should respond to the complaint within 1 week
    - If it is a fault arising from the installation workmanship, it is the Approved Company's responsibility to rectify the problem by correcting, repairing or replacing the faulty items/ accessories or installation.
    - If it is an equipment fault, the Approved Company should liaise with the equipment manufacturer to rectify the issue as soon as

- possible.
- ii. If the failure is after the 2 years' installation warranty period:
    - An Approved Company shall still provide back-up service to the customer and must respond to the complaint in a timely manner.
    - This response should initially involve attempting to determine the fault remotely and then, if required, to organise a visit to the system to determine the fault and then to rectify the fault as soon as possible. A reasonable price should be quoted to the customer for the call-out; that is the price should be reflective of the price quoted for other work and not be higher than standard pricing because the customer has a problem with their system and needs help.
    - If it is a fault in the installation's workmanship, the Approved Company shall provide the customer with a quotation for repairs, re-installation or replacement of smaller items or accessories.
    - If it is a fault in the equipment, the Approved Company shall liaise with the equipment manufacturer to fix the product as soon as possible. The cost in providing the repairs will be quoted to the customer. If the equipment is still under warranty, the cost should just be for the time spent travelling to/from site and onsite while undertaking the replacement (or repairs) of equipment unless this will be paid by the manufacturer.
  - k) If a customer complains to an Approved Company that they believe the system is not performing as stated in the quotation, the Approved Company shall request from the customer the evidence as to why they have come to this conclusion. If it appears that it is really not performing as anticipated, then the Approved company shall investigate why in a prompt and professional manner.
  - l) The Approved Company shall attempt to solve all complaints in a professional manner and directly with the customer.
  - m) An Approved Company shall not criticise the work of another Approved Company directly
  - n) If a system inspection is undertaken of the work of an Approved Company, the Approved company shall respond to any reasonable request by the inspector to fulfil his or her duties.

## 10 Application Form

### 10.1 General Information in Company

<b>COMPANY APPLICATION FORM</b>	
<b>Part 1: General Information on Company</b>	
Name of Company	
Physical Address of Main Office/Shop	
Postal Address (if different)	
Website	
Name of Contact	
Position	
E-mail	

Phone	
Mobile Phone	
Name of Alternate Contact	
Position	
E-mail	
Phone	
Mobile Phone	
Information on the company management structure showing where the contact person is positioned is included with the application? <i>(please tick if yes, cross if no)</i>	
List any accreditation that company might have and the date of their expiry	
Information on their number of staff with a breakdown is included with the application <i>(please tick if yes, cross if no)</i>	
Information on their operation including number of outlets is included with the application <i>(please tick if yes, cross if no)</i>	
Information on their complaints procedure is included with the application <i>(please tick if yes, cross if no)</i>	

## 10.2 Component Information

<b>Part 2: Component Information</b>					
<i>List All Brands , the product models or range of models and enter tick that test certificate has been provided or enter a cross if not . Please provide copies of the product brochures. (add more lines as required)</i>					
Name of Company					
Brands of Solar Modules					
Models	Model Number (s)	Peak Power Rating (or range)	Number of Cells in Module	Test Certificate Provided <i>(tick if yes, cross if no)</i>	
Brands of Batteries Models	Model Number (s)	Battery Chemistry- Lead or Lithium or?	Capacity (Ah or Wh)	Voltage of Battery (V)	Test Certificate Provided <i>(tick if yes, cross if no)</i>
Brands of Solar Controllers					
Models	Model Number (s)	MPPT or PWM	Current or power rating in	Voltage rating out	Test Certificate Provided <i>(tick if yes, cross if no)</i>
Brands of Inverters					
Models	Model Number (s)	Capacity (VA or W)	d.c. Voltage (V)	Test Certificate Provided	


### 10.3 System Designs

<b>Part 3: System Designs</b>				
<i>Complete this form for three different system designs and provide any other evidence that is relevant</i>				
Name of Company				
<b>Design Number One</b>				
The total load energy : a.c and/or d.c. that the system can supply.	a.c. only system	Wh	d.c only systems	Wh
	System designed for a.c. and d.c, loads			
	a.c. loads	Wh	d.c loads	Wh
d.c. system (battery) voltage			V	
Brand of solar module		Model number		
Peak Power Rating		Number of cells		
Number of solar modules				
Size of array in Watts peak (Combined power of all modules)			W <sub>p</sub>	
Number of solar modules in series		Number of parallel strings of modules		
The open circuit voltage of the array (nameplate).			V	
The daily irradiation value used in the design			kWh/m <sup>2</sup>	
Brand of Solar Controller		Model Number		
The type of solar controller (Maximum Power Point Tracker (MPPT) or standard controller Pulse Width Modulated (PWM) provided with the system. <i>(Please Tick)</i>		MPPT		PWM
Specifications of the solar controllers	Maximum d.c. current in	A	Maximum d.c. current out	A
	d.c. voltage in	V	d.c voltage out	V
	If MPPT Max voltage In	V	If MPPT Max Power (Array) In	W
	Maximum Load Current (if applicable)			A
The total capacity of the battery bank (Wh or Ah)				
The type of battery (e.g. flooded lead acid, valve regulated lead acid , lithium ion etc).				
Brand of Battery		Model Number		
Capacity of each battery (Wh or Ah)		Voltage of each battery	V	
Total number of individual batteries in the battery bank				
Number of individual batteries in series		Number of parallel strings of batteries		
Brand of Inverter		Model Number		
Power Rating of Inverter (VA or W)		d.c. Voltage	V	
Module Derating Factors used in determining the energy output of the system	Temperature		Dirt	
	Manufacturers Tolerance			
Array oversize factor				
Battery days of autonomy				
Battery maximum depth of discharge				
Sub-system losses	Controller efficiency (Considered in design)			
	Battery efficiency (Considered in design)			
	Cable efficiency (Considered in design)			
	Inverter efficiency (Considered in design)			

<b>Design Number Two</b>				
The total load energy : a.c and/or d.c. that the system can supply.	a.c. only system	Wh	d.c only systems	Wh
	System designed for a.c and d.c loads			
	a.c. loads	Wh	d.c loads	Wh
d.c. system (battery) voltage			V	
Brand of solar module		Model number		
Peak Power Rating		Number of cells		
Number of solar modules				
Size of array in Watts peak (Combined power of all modules)			W <sub>p</sub>	
Number of solar modules in series		Number of parallel strings of modules		
The open circuit voltage of the array (nameplate).			V	
The daily irradiation value used in the design			kWh/m <sup>2</sup>	
Brand of Solar Controller		Model Number		
The type of solar controller (Maximum Power Point Tracker (MPPT) or standard controller Pulse Width Modulated (PWM) provided with the system. <i>(Please Tick)</i>		MPPT		PWM
Specifications of the solar controllers	Maximum d.c. current in	A	Maximum d.c. current out	A
	d.c. voltage in	V	d.c voltage out	V
	If MPPT Max voltage In	V	If MPPT Max Power (Array) In	W
	Maximum Load Current (if applicable)			A
The total capacity of the battery bank (Wh or Ah)				
The type of battery (e.g. flooded lead acid, valve regulated lead acid , lithium ion etc).				
Brand of Battery		Model Number		
Capacity of each battery (Wh or Ah)		Voltage of each battery	V	
Total number of individual batteries in the battery bank				
Number of individual batteries in series		Number of parallel strings of batteries		
Brand of Inverter		Model Number		
Power Rating of Inverter (VA or W)		d.c. Voltage	V	
Module Derating Factors used in determining the energy output of the system	Temperature		Dirt	
	Manufacturers Tolerance			
Array oversize factor				
Battery days of autonomy				
Battery maximum depth of discharge				
Sub-system losses	Controller efficiency (Considered in design)			
	Battery efficiency (Considered in design)			
	Cable efficiency (Considered in design)			
	Inverter efficiency (Considered in design)			
<b>Design Number Three</b>				
The total load energy : a.c and/or d.c. that the system can supply.	a.c. only system	Wh	d.c, only systems	Wh
	System designed for a.c and d.c. loads			
	a.c. loads	Wh	d.c loads	Wh
d.c. system (battery) voltage			V	
Brand of solar module		Model number		
Peak Power Rating		Number of cells		

Number of solar modules			
Size of array in Watts peak (Combined power of all modules)		W <sub>p</sub>	
Number of solar modules in series		Number of parallel strings of modules	
The open circuit voltage of the array (nameplate).		V	
The daily irradiation value used in the design		kWh/m <sup>2</sup>	
Brand of Solar Controller		Model Number	
The type of solar controller (Maximum Power Point Tracker (MPPT) or standard controller Pulse Width Modulated (PWM) provided with the system. <i>(Please Tick)</i> )		MPPT	PWM
Specifications of the solar controllers	Maximum d.c. current in	A	Maximum d.c. current out
	d.c. voltage in	V	d.c voltage out
	If MPPT Max voltage In	V	If MPPT Max Power (Array) In
	Maximum Load Current (if applicable)		A
The total capacity of the battery bank (Wh or Ah)			
The type of battery (e.g. flooded lead acid, valve regulated lead acid , lithium ion etc).			
Brand of Battery		Model Number	
Capacity of each battery (Wh or Ah)		Voltage of each battery	V
Total number of individual batteries in the battery bank			
Number of individual batteries in series		Number of parallel strings of batteries	
Brand of Inverter		Model Number	
Power Rating of Inverter (VA or W)		d.c. Voltage	V
Module Derating Factors used in determining the energy output of the system	Temperature		Dirt
	Manufacturers Tolerance		
Array oversize factor			
Battery days of autonomy			
Battery maximum depth of discharge			
Sub-system losses	Controller efficiency (Considered in design)		
	Battery efficiency (Considered in design)		
	Cable efficiency (Considered in design)		
	Inverter efficiency (Considered in design)		
The total load energy : a.c. and/or d.c. that the system can supply.	a.c. only system	Wh	d.c. only systems
	System designed for a.c and d.c. loads		
	a.c. loads	Wh	d.c loads

## 10.4 Installer Information

### 10.4.1 Application by Experienced Installer

<b>Part 4.1: Application by Experienced Installer</b>	
Name of Installer	
Name of Company	
Letter is provided from company stating how many years you have been an installer with the company.	

How many systems (approximately) have you installed?			
Based on the size of the solar array: What has been smallest system (and what has been the largest system you have installed).	From W <sub>p</sub>	W <sub>p</sub> to	
List the Training Courses the Installer has completed? <i>Please attach any certificates or documents verifying that the courses were undertaken</i>	Course	Year	Certificate Attached (tick)
<i>Complete this forms for three different system installed</i>			
<b>If you have not installed 3 different sizes how many sizes have you and installed</b>			
<b>Installation Number One</b>			
Has a wiring diagram been attached to the application? ( <i>tick box on RHS if provided</i> )			
Have photos of this size system been attached to the application? ( <i>tick box on RHS if provided</i> )			
d.c. system (battery) voltage		V	
Brand of solar module		Model number	
Peak Power Rating		Number of cells	
Number of solar modules			
Size of array in Watts peak (Combined power of all modules)		W <sub>p</sub>	
Number of solar modules connected in series		Number of parallel strings of modules	
Brand of Solar Controller		Model Number	
The type of solar controller (Maximum Power Point Tracker (MPPT) or standard controller Pulse Width Modulated (PWM) provided with the system. ( <i>Please Tick</i> ))		MPPT	PWM
Specifications of the solar controllers	Maximum d.c. current in	A	Maximum d.c. current out
	d.c. voltage in	V	d.c. voltage out
	If MPPT Max voltage In	V	If MPPT Max Power (Array) In
	Maximum Load Current (if applicable)		A
The total capacity of the battery bank (Wh or Ah)			
The type of battery (e.g. flooded lead acid, valve regulated lead acid, lithium ion etc).			
Brand of Battery		Model Number	
Capacity of each battery (Wh or Ah)		Voltage of each battery	V
Total number of individual batteries in the battery bank			
Number of individual batteries in series		Number of parallel strings of batteries	
Brand of Inverter		Model Number	
Power Rating of Inverter (VA or W)		d.c. Voltage	V
Protection (circuit breakers or fuses) been installed) <i>Provide Current ratings if installed</i>	Battery to controller		A
	Type		
	Controller to Solar Modules		A
	Type		

	Controller to Loads		A	
	Type			
	In controller		A	
	Battery to Inverter		A	
	Type			
Isolation or Switches been installed <i>Provide Current ratings if installed</i>	Battery to controller		A	
	Controller to Solar Modules		A	
	Controller to Loads		A	
	Battery to Inverter		A	
<b>Installation Number Two</b>				
d.c. system (battery) voltage			V	
Brand of solar module		Model number		
Peak Power Rating		Number of cells		
Number of solar modules				
Size of array in watts peak (Combined power of all modules)			W <sub>p</sub>	
Number of solar modules in series		Number of parallel strings of modules		
The open circuit voltage of the array (nameplate).			V	
The type of solar controller (Maximum Power Point Tracker (MPPT) or standard controller Pulse Width Modulated (PWM) provided with the system. <i>(Please Tick)</i>		MPPT		PWM
Specifications of the solar controllers	Maximum d.c. current in	A	Maximum d.c. current out	A
	d.c. voltage in	V	d.c voltage out	V
	If MPPT Max voltage In	V	If MPPT Max Power (Array) In	W
	Maximum Load Current (if applicable)			A
The total capacity of the battery bank (Wh or Ah)				
The type of battery (e.g. flooded lead acid, valve regulated lead acid, lithium ion etc).				
Brand of Battery		Model Number		
Capacity of each battery (Wh or Ah)		Voltage of each battery	V	
Total number of individual batteries in the battery bank				
Number of individual batteries in series		Number of parallel strings of batteries		
Brand of Inverter		Model Number		
Power Rating of Inverter (VA or W)		d.c. Voltage	V	
Protection (circuit breakers or fuses) been installed <i>Provide Current ratings if installed</i>	Battery to controller		A	
	Type			
	Controller to Solar Modules		A	
	Type			
	Controller to Loads		A	
	Type			
	In controller		A	
	Battery to Inverter		A	
Type				
Isolation or Switches been installed <i>Provide Current ratings if installed</i>	Battery to controller		A	
	Controller to Solar Modules		A	
	Controller to Loads		A	
	Battery to Inverter		A	
<b>Installation Number Three</b>				
d.c. system (battery) voltage			V	
Brand of solar module		Model number		
Peak Power Rating		Number of cells		

Number of solar modules			
Size of array in watts peak (Combined power of all modules)		W <sub>p</sub>	
Number of solar modules in series		Number of parallel strings of modules	
Brand of Solar Controller		Model Number	
The type of solar controller (Maximum Power Point Tracker (MPPT) or standard controller Pulse Width Modulated (PWM) provided with the system. <i>(Please Tick)</i> )		MPPT	PWM
Specifications of the solar controllers	Maximum d.c. current in	A	Maximum d.c. current out
	d.c. voltage in	V	d.c voltage out
	If MPPT Max voltage In	V	If MPPT Max Power (Array) In
	Maximum Load Current (if applicable)		A
The total capacity of the battery bank (Wh or Ah)			
The type of battery (e.g. flooded lead acid, valve regulated lead acid , lithium ion etc).			
Brand of Battery		Model Number	
Capacity of each battery (Wh or Ah)		Voltage of each battery	V
Total number of individual batteries in the battery bank			
Number of individual batteries in series		Number of parallel strings of batteries	
Brand of Inverter		Model Number	
Power Rating of Inverter (VA or W)		d.c. Voltage	V
Sub-system losses	Battery to controller	A	
	Type		
Protection (circuit breakers or fuses) been installed <i>Provide Current ratings if installed</i>	Battery to controller	A	
	Type		
	Controller to Solar Modules	A	
	Type		
	Controller to Loads	A	
	Type		
	In controller	A	
	Battery to Inverter	A	
Type			
Isolation or Switches been installed <i>Provide Current ratings if installed</i>	Battery to controller	A	
	Controller to Solar Modules	A	
	Controller to Loads	A	
	Battery to Inverter	A	

#### 10.4.2 Application by Installer with Z Permit

<b>Part 4.2: Application by Installer with Z Permit</b>	
Name of Installer	
Number of years installing systems	
Year the Installer received the Z permit	
Copy of Z Permit Attached (please tick if yes)	

### 10.4.3 Application by Installer with Formal Training

<b>Part 4.3: Application by Installer with formal Training</b>		
Name of Installer		
Number of years installing systems		Years
Name of Course		
Name of Training Centre		
Location of Training centre		
Website for Training centre		
Year course completed		
Course Completion Certificate attached	Yes/No	
Training course meets the requirements of the “Assessment and Training Package for Solar Photovoltaic Electrician”	Yes/No	
If no,	Is this course recognised internationally?	Yes/No
	Provide following information	
	Course Overview (tick that it is attached)	
	Length of course	
	What assessments were undertaken	
	Your assessment mark	
	What third party accreditation the training centre has	
	<b>please attach all information you have on the course as evidence that it is an appropriate course</b>	
If Yes	Evidence provided that course meets the Assessment and Training Package for Solar Photovoltaic Electrician	Yes/No
	Evidence provided that training centre is approved for conducting the Assessment and Training Package for Solar Photovoltaic Electrician	Yes/No

## 11 Application Checklist

### 11.1 Application Checklist- Parts 1 ,2 and 3

COMPANY APPLICATION CHECKLIST			
<b>Part 1: General Information on Company</b>			
Name of Company			
All information on address and contact information was provided?		Yes/No	
If not- what was not provided?			
Information on the company management structure showing was provided		Yes/No	
Copies of any accreditation certificates were provided?		Yes/No	
Company is a:	Private Limited		Public Company
<i>Please Tick</i>	Liability Company;		
Company has been operating for		Years	
Copy of the Incorporation Certificate from the Uganda Registration Service Bureaus was provided?		Yes/No	
Copy of the Investment Licence from the Uganda Investment Authority was provided?		Yes/No	
Taxpayers Identification Number (TIN)			
Copy of the Trading License from Kampala Capital City Authority or similar ( if operating in another town or municipality) was provided?		Yes/No	
Evidence that the company is registered with the National Social Security Fund was provided?		Yes/No	
Sample of company seal was provided?		Yes/No	
<b>Part 2: Component Information</b>			
Company has <b>solar modules</b> that meet the Component Requirements?		Yes/No	
Approved modules include:			
Brand		Models	
Brand		Models	
Were there any solar modules that did not meet the component requirements?		Yes/No	
If so what brand and models were they and why?			
Brand		Models	
Reason			
Company has <b>solar controllers</b> that meet the Component Requirements?		Yes/No	
Approved solar controllers include:			
Brand		Models	
Brand		Models	
Were there any solar controllers that did not meet the component requirements?		Yes/No	
If so what brand and models were they and why?			
Brand		Models	
Reason			
Company has <b>batteries</b> that meet the Component Requirements?		Yes/No	
Approved batteries include:			
Brand		Models	
Brand		Models	
Were there any batteries that did not meet the component requirements?		Yes/No	
If so what brand and models were they and why?			
Brand		Models	
Reason			
Company has <b>inverters</b> that meet the Component Requirements?		Yes/No/NA	
Approved batteries include:			
Brand		Brand	
Brand		Brand	
Were there any inverters that did not meet the component requirements?		Yes/No/NA	
If so what brand and models were they and why?			

Brand		Brand	
Reason			
<b>Part 3 System Designs</b>			
System Design 1 met the design guidelines			Yes/No
If no, why not			
System Design 2 met the design guidelines			Yes/No
If no, why not			
System Design 1 met the design guidelines			Yes/No
If no, why not			
<b>CONCLUSION</b>			
Company meets the technical requirements for providing component based solar home systems?			Yes/No
If not ,why not and what needs to be undertaken by the company to rectify the non-compliance?			
Name of Verifier			
Signature			
Date			

## 11.2 Application Checklist- 4

### 11.2.1 Application by Experienced Installer

<b>Part 4.1 INSTALLER APPLICATION CHECKLIST_ Application by Experienced Installer</b>			
Name of Installer			
Letter Provided by company stating number of years person been installing for the company.			Yes/No
Installer been doing installation for			Years
How many systems (approximately ) have you installed?			
Based on the size of the solar array what has been there range?	From Wp to Wp		
Installer has attended training courses?			Yes/No
How many?			
Installer has installed a minimum of 3 different system sizes			Yes/No
If not 3 how many?			
<b>System installations</b>			
System Installation 1 Information provided			Yes/No
Wiring Diagram provided			Yes/No
Photos of typical system provided			Yes/No
Comments on system installation			
System Installation 2 Information provided			Yes/No

Wiring Diagram provided	Yes/No
Photos of typical system provided	Yes/No
Comments on system installation	
System Installation 3 Information provided	Yes/No
Wiring Diagram provided	Yes/No
Photos of typical system provided	Yes/No
Comments on system installation	
<b>CONCLUSION</b>	
Installer meets the initial assessment and eligible to undertake the multiple choice assessment ?	Yes/No
If not ,why not and what needs to be undertaken by the company to rectify the non-compliance?	
Name of Verifier	
Signature	
Date	
Installer undertook the multiple choice assessment ?	Yes/No
Date taken	
Mark Obtained out of 100	
Installer Passed	Yes/No
Installer Eligible to be approved	Yes/No
Name of Verifier	
Signature	
Date	
Installer undertook the multiple choice assessment ?	Yes/No
Date taken	
Mark Obtained out of 100	
Installer Passed	Yes/No
Installer Eligible to be approved	Yes/No
If not-what is the recommendation	
Name of Verifier	
Signature	
Date	

### 11.2.2 Application by Installer with Z Permit

<b>Part 4.2 INSTALLER APPLICATION CHECKLIST_ Application by Experienced Installer</b>	
Name of Installer	
Installer been doing installation for	Years
Year Installer received the Z permit	
Copy of Z permit attached	Yes/No

Installer meets the initial assessment and eligible to undertake the multiple choice assessment ?	Yes/No
If not ,why not and what needs to be undertaken by the company to rectify the non-compliance?	
Name of Verifier	
Signature	
Date	
Installer undertook the multiple choice assessment ?	Yes/No
Date taken	
Mark Obtained out of 100	
Installer Passed	Yes/No
Installer Eligible to be approved	Yes/No
Name of Verifier	
Signature	
Date	
Installer undertook the multiple choice assessment ?	Yes/No
Date taken	
Mark Obtained out of 100	
Installer Passed	Yes/No
Installer Eligible to be approved	Yes/No
If not-what is the recommendation	
Name of Verifier	
Signature	
Date	

### 11.2.3 Application by Formally Trained Installer

<b>Part 4.3 INSTALLER APPLICATION CHECKLIST- Application by Formally Trained Installer</b>		
Name of Installer		
Installer been doing installation for	Years	
Installer has attended training courses that meets the requirements of the “Assessment and Training Package for Solar Photovoltaic Electrician”	Yes/No	
Name of Course		
Name of Training Centre		
Location of Training centre		
Website for Training centre		
Year course completed		
Course Completion Certificate attached	Yes/No	
Training course meets the requirements of the “Assessment and Training Package for Solar Photovoltaic Electrician”	Yes/No	
If No	Is this course recognised internationally?	Yes/No
	Following Information has been provided	
	Course Overview	Yes/No
	Length of course	Yes/No
	Assessment information	Yes/No
	assessment mark provided?	Yes/No
	assessment mark	

	The training centre has What third party accreditation	Yes/No
	Who by?	
	Is this course recognised internationally?	Yes/No
	Is the course approved by assessor as being appropriate	Yes/No
If Yes	Sufficient Evidence has been provided that course meets the Assessment and Training Package for Solar Photovoltaic Electrician	Yes/No
	Sufficient Evidence has been provided that training centre is approved for conducting the Assessment and Training Package for Solar Photovoltaic Electrician	Yes/No
<b>CONCLUSION</b>		
Installer meets the initial assessment and eligible to undertake the multiple choice assessment ?		Yes/No
If not ,why not and what needs to be undertaken by the company to rectify the non-compliance?		
Name of Verifier		
Signature		
Date		
Installer undertook the multiple choice assessment ?		Yes/No
Date taken		
Mark Obtained out of 100		
Installer Passed		Yes/No
Installer Eligible to be approved		Yes/No
Name of Verifier		
Signature		
Date		
Installer undertook the multiple choice assessment ?		Yes/No
Date taken		
Mark Obtained out of 100		
Installer Passed		Yes/No
Installer Eligible to be approved		Yes/No
If not-what is the recommendation		
Name of Verifier		
Signature		
Date		