PVMTI Technical Guidelines (India)

1. *General Conformity*

1.1 The Company should source photovoltaic modules, batteries and other balance of system equipment from organisations possessing a valid certificate of registration for ISO-9000 and/or ISO-14000 or organisations which, having completed pre-certification requirements, have submitted an application for ISO Registration.

1.2 The Company should source batteries only from manufacturers having formal agreements/certification for waste and recycled battery materials disposal at facilities approved by Indian Central and/or State Authorities. (ie: Pollution Control Boards).

1.3 The Company should develop and adhere to a Quality Process Manual, and should ensure that (1) the Quality Process Manual is approved through ISO Certification or (2) the Quality Process Manual reflects the relevant sections of the PV-GAP[1] manufacturing Quality Process Manual (Version 1.3 March 1999 or later editions).

1.4 The Company should work towards sourcing, manufacturing or supplying components compliant to the IEC Certification System and systems that gain approval under the PV-GAP Recommended Standard as outlined in Reference Manual PV-GAP 01, March 1998 and December 1998 or subsequently issued amendments.

2. *Specific conformity applicable to Stand Alone and Direct Current Solar Home Systems (SHS) powered from photovoltaic energy sources.*

2.1 The Company should source or manufacture SHS in compliance with the compulsory requirements for photovoltaic components laid out in "Universal Technical Standards for Solar Home Systems (version 2 – June, 2001)", hereafter referred to as "Thermie UTS").

2.2 The Company should comply with the PV Solar Home System Qualification Procedures (June, 2001), published by the Instituto de Energia Solar, Univeridad Politecnica de Madrid, when testing any solar home system.

2.3 The Company should work towards implementing the recommendations for photovoltaic components of Thermie UTS.

2.4 The Company should take into consideration the suggestions documented in Thermie UTS.

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[1] *"Global Approval Program for Photovoltaics".*

3. Specific conformity applicable to direct and/or alternating current, stand-alone, hybrid or grid-tied photovoltaic equipment other than SHS.

3.1 The Company should source or manufacture and supply for use photovoltaic system components which meet the following normative references:

(i) photovoltaic modules:

3.1.1 Crystalline silicon terrestrial photovoltaic modules with Type Approval Certification in compliance with IEC 1215 Ed 1.0 or later.

3.1.2 Thin film terrestrial photovoltaic modules with Type Approval Certification in compliance with IEC 1646 Ed 1.0. or later

(ii) Secondary cells and batteries for photovoltaic energy systems:

3.1.3 Type Approval Certification in compliance with draft IEC Standard Reference IEC 61427-1 Ed 1 or later

(iii) Charge controllers/regulators:

3.1.4 Type Approval Certification in compliance with the compulsory requirements for photovoltaic components laid out in Thermie UTS

(iv) Invertors:

3.1.5 Type Approval Certification in compliance with IEC Standard Reference IEC 146 or Draft Working Document of Project 11848 (Invertors: Grid tied and Stand Alone).

3.2 The Company should ensure that other components of any photovoltaic system should meet applicable standards. A list of applicable standards is available from the IFC or its designated agent upon request.

4. Type Approval Tests

4.1 The Company should arrange for qualification testing of non-qualified components or systems at (1) a certified IEC testing laboratory or (2) a laboratory in India acceptable to IFC or its designated agent. The protocol for testing if other than IEC, shall be defined by the testing facility in association with IFC or its designated agent with close collaboration of the Company and product manufacturer.

4.2 Type approval tests for all photovoltaic applications (other than SHS) shall be:

4.2.1 In compliance with the applicable IEC Standard for products and components or, when not available, the PV-GAP recommended standards.

4.2.2 In compliance with the PV-GAP recommended protocol for systems or installations of systems.

4.3 Where components or systems are not certified according to norms defined in Sections 2 and 3, but have been working satisfactorily in the field for a minimum of 12 months, and detailed field performance records are acceptable to IFC or its designated agent, such components can be installed without waiting for the results of the qualification tests.

5. Operational Performance

5.1 The Company should follow a program of evaluation and improvement of quality of products placed in the market. This program shall be defined in the Quality Process Manual. The program should comprise:

5.1.1 Evaluation according to Failure Mode Effect Analysis (FMEA) to identify frequently occurring defects of installed photovoltaic systems

5.1.2 Application of Robust Design Protocol for quality and cost improvement.

5.2 The Company should provide preventive maintenance and prompt replacement of failed components and systems installed.

5.3 The Company should:

5.3.1 *Quality Planning and Analysis Exercise:* Undertake the exercise of quality function deployment which provides a means of translating customer requirements into technical requirement for each stage of product development and production, particularly in respect of batteries, charge regulators, inverters and appliances

5.3.2 *Quality Improvement Exercise:* Undertake a reliability programme appropriately designed on the basis of failure modes, effects and criticality analysis (FMECA)

5.3.3 *Quality Training and Implementation (Robust Design) Programme:* Be familiar with or undertake training programmes for effective application for training in robust design.

In this schedule, the following terms have the meanings set forth opposite them:

"Balance of Systems" means components of the photovoltaic system other than the photovoltaic array;

"Failure Modes, Effects and Criticality Analysis" means analysis of scenarios that may affect the performance of a component (of a photovoltaic system) and assessment of any resultant performance degradations;

"Failure Mode Effect Analysis" means analysis of the effect of a component failure on other components of the system and on the overall performance and integrity of the system;

"IEC" means International Electrotechnical Commission;

"IEC Standards" are those developed by the IEC in consultation with National Committees and are available from IEC Central office, 3 Rue de Varambe, Box 131, Geneva CH-211 Geneva;

"ISO" means International Standards Organisation;

"Quality Process Manual" means the Company's reference manual of procedures and processes designed to ensure a continuous assessment and improvement of the quality of the products and service provided by the Company;

"PV-GAP" means Global Approval Programme for Photovoltaics. (See web-site: http://www.pvgap.org). Photovoltaic-GAP is a global, Photovoltaic industry driven organisation that strives to promote and maintain a set of quality standards and approval procedures for the performance of photovoltaic products and systems, and to ensure quality, durability and reliability;

"PV-GAP Manufacturing Quality Process Manual" means the draft "Quality Process Manual" developed by PV-GAP;

"Reference Manual PVGAP 01" is the reference manual developed by PV-GAP detailing the approval process, standards, statutes and bye laws of PV-GAP;

"Robust Design Protocol" means the set of criteria for ensuring that the design of a Photovoltaic component or system results in a high quality, reliable product;

"Thermie UTS" Is the Universal Technical Standard for Solar Home Systems developed under a project of the European Commission's Directorate General for Energy (DGXVII) Thermie B Programme. Copies are available from IES-UPM, Cuidad Univeritaria, 28040-Madridm Spain (email egido@ies-def.upms.es) or OPET offices of the EU member states;

"Type Approval Certification" is granted to a photovoltaic component or system following a thorough testing of that component or system to assess its suitability for the purpose intended; and

Other definitions relating to IEC, PV-GAP, standards, certification, testing and the photovoltaic industry in general are in the Glossary of the "PV-GAP Reference Manual".