The Certification Mark for Onsite
Sustainable Energy Technologies

Microgeneration Certification Scheme: MCS 017

Product Certification Scheme Requirements:
Bespoke Building Integrated Photovoltaic Products

Issue 1.2

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This standard has been approved by the Steering Group of the Microgeneration Certification Scheme.

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REVISION OF MICROGENERATION INSTALLATION STANDARDS

Microgeneration Installation Standards will be revised by issue of revised editions or amendments. Details will be posted on the website at www.microgenerationcertification.org

Technical or other changes which affect the requirements for the approval or certification of the product or service will result in a new issue. Minor or administrative changes (e.g. corrections of spelling and typographical errors, changes to address and copyright details, the addition of notes for clarification etc.) may be made as amendments.

The issue number will be given in decimal format with the integer part giving the issue number and the fractional part giving the number of amendments (e.g. Issue 3.2 indicates that the document is at Issue 3 with 2 amendments).

Users of this Standard should ensure that they possess the latest issue and all amendments.

TABLE OF CONTENTS

1. SCOPE 4
2. APPLICATIONS TO JOIN THE SCHEME 5
3. MANAGEMENT SYSTEMS CERTIFICATION 6
4. CERTIFICATION AND APPROVAL 6
   - 4.1 BBIPV product family 6
   - 4.2 BBIPV test sample 10
   - 4.3 BBIPV test requirements 10
   - 4.4 Deflection test 11
   - 4.5 Generic standards 11
   - 4.6 Design and product control requirements 12
   - 4.7 Quality and production control 13
   - 4.8 Product marking and Data 13
5. TECHNICAL DOCUMENTATION 15
6. MAINTENANCE OF CERTIFICATION AND LISTING 16
   - 6.1 Factory audits 16
   - 6.2 Product audits 16
7. CERTIFICATION MARK AND LABELLING 17

REVISION OF MICROGENERATION CERTIFICATION SCHEME REQUIREMENTS 18

AMENDMENTS ISSUES SINCE PUBLICATION 19

FOREWORD

The following document contains provisions which, through reference in this text, constitute normative or informative provisions of this document (MCS 017). At the time of publication, the editions indicated were valid. All documents are subject to revision, and parties applying this document (MCS 017) are encouraged to investigate the possibility of applying the most recent editions of the documents referenced.

The following document MCS 017 issue 1.2 is a minor update to MCS 007 Issue 1.1. It is available for reference from the date of publication 16/06/2017. Manufacturers, or importers of microgeneration systems who have certificated a microgeneration product in accordance with MCS 017 Issue 1.1, shall commence working in accordance with this update from the date of publication.

1. SCOPE

This document describes the measures required for a bespoke building integrated photovoltaic (BBIPV) product to be certified under the MCS scheme.

Due to the wide variability in BBIPV products, the “standard module” approach for certification of products is not practicable.

A BBIPV product is one that is tailored and manufactured to a specific project, with a size, shape and configuration particular to that project. For the purposes of this document, a BBIPV product is defined as being a PV unit that is manufactured in varying sizes and configurations solely for the purpose of being built into the fabric of a structure - such as PV glazing, PV façade units or PV shading units.

PV modules and tiles which do not meet the above criteria require certification under MCS 005. Where there is any doubt about the applicable standard (MCS 005 or MCS 017) then clarification shall be sought from MCS.

This document addresses certification of such products by:

a) Defining how a BBIPV manufacturer can declare a BBIPV product family
b) Stating the sample size and configuration that is required for testing
c) Stating the relevant IEC tests that need to be performed on the sample
d) Defining the processes and procedures that the manufacturer must have in place in order to control the manufacture of BBIPV products within the family
e) Defining the processes and procedures that the manufacturer must have in place in order to ensure that the BBIPV product is suitable for the intended application

2. APPLICATIONS TO JOIN THE SCHEME

Applications should be made to an accredited certification body operating this scheme, who will provide the appropriate application form and details of the applicable fees.

3. MANAGEMENT SYSTEMS CERTIFICATION

Manufacturers shall operate a certified documented manufacturing quality control system, in accordance with the requirements of MCS 010 “Generic Factory Production Control Requirements”

4. CERTIFICATION AND APPROVAL

4.1 BBIPV product family

For the purposes of MCS certification, a BBIPV product family is taken to be a related series of products that only vary as permitted within this document.

For any declared (certified) BBIPV product family, this document sets out two categories of parameters:

a) Parameters that must stay the same across the product family
b) Parameters that can vary (under controlled circumstances) across the product family

4.1.1 Parameters that must be declared and remain the same across the product family

Within a product family, none of the following are permitted to vary:

- Cell interconnect material
- Module bus bar material
- Solder technique and material
- Front face material
- Rear face material

NOTE: - For the rear face material, as an example, the thickness of the material may change, but the material type must remain the same (i.e. glass must remain glass)

The manufacturer must also declare the maximum deflection permitted for the product: *L/x* (where L is the BBIPV length and x is the value declared by the manufacturer for the product family).

NOTE: The manufacturer must ensure that controls are in place to ensure that modules supplied within a BBIPV product family are not placed into applications where the module deflection limitations are likely to be exceeded.

4.1.2 Parameters that are allowed to vary under controlled circumstances across the product family

This section sets out the extent of variations permitted for component parts in a BBIPV product family.

For some of these variations, the manufacturer will need to declare design limits that apply to the product family. This section sets out where this is required.

4.1.2.1 Cell string maxima

For each BBIPV product family, the manufacturer must declare the following cell string maxima:

- Maximum string open circuit voltage (Voc stc)
- Maximum string short circuit current (Isc stc)
- Maximum string power (Pmpp stc)

For any product then manufactured within a BBIPV family, the string design (cell type and quantity) may be varied providing none of the above maxima are exceeded.

4.1.2.2 Module maxima

For each BBIPV product family, the manufacturer must declare the following module maxima:

- Maximum module open circuit voltage (Voc stc)
- Maximum module short circuit current (Isc stc)
- Maximum module power (Pmpp stc)

For any product then manufactured within a BBIPV family, the module design (cell type and quantity) may be varied providing none of the above maxima are exceeded.

4.1.2.3 Number of cells

For any product manufactured within a BBIPV family, the number of cells may be varied providing the string/module voltage, current or power maxima are not exceeded (as above).

4.1.2.4 PV cell manufacturer and model

Within a BBIPV product family, cells may be selected from differing suppliers providing that the cell technology remains constant and the string/module voltage, current or power maxima are not exceeded.

For example, if IEC certification has been carried out using a cell with a SiN antireflection coating and an Aluminium back surface field then both Mono and polycrystalline silicon cells can be selected from varying manufacturers providing that the antireflection coating and the back surface field are of the same technology as the IEC approval samples.

4.1.2.5 Junction Box

Junction boxes may be varied providing that the model utilised during IEC testing is independently certified to VDE 0126-5/05.08/ IEC 61215 and that the proposed replacement holds the same certification.

Junction boxes must also be rated for the module voltage, current and power maxima listed for the BBIPV product family.

Diodes are often supplied with Junction boxes where this is the case then the diode matching the Junction box certification can also be varied (see also section on bypass diodes).

4.1.2.6 Bypass Diode

Bypass diodes can only be varied as part of a junction box variation. Bypass diodes encapsulated into a PV module laminate cannot be varied.

4.1.2.7 Cable type

Cable type must comply with the requirements of the MCS *"Guide to the installation of Photovoltaic Systems*".

The output cable length can be varied.

The output cable cross sectional area can be varied, provided it is not varied to a cross sectional area below the declared value from the IEC test.

4.1.2.8 Connectors

Connectors can be varied providing that the connectors are certified to EN50521:2008 “Connectors for photovoltaic systems”. The connector can also be omitted (panel supplied with flying lead type cables).

4.1.2.9 Glass type and thickness

For a BBIPV product family that uses glass in the front or rear face, the manufacturer must declare the minimum glass thickness permitted within the BBIPV product family. For any product then manufactured within a BBIPV family, the glass thickness must not be less than this declared value.

Where front or rear face of the product is glass, the glass thickness may be varied, subject to meeting the glazing and building standards detailed later in this document

Where the front or rear face is glass, the glass type may be either heat strengthened or toughened glass, subject to meeting the glazing and building standards detailed later in this document

NOTE: where the front or rear face is any material other than glass (e.g. PVF Film), the specification of this material cannot be varied in any way, including its thickness.

4.1.2.10 Edge clearances

The manufacturer must declare the minimum edge clearance (distance from cell edge to product edge) that is permitted.

For any product then manufactured within a BBIPV family, the edge clearance may be varied providing it is greater than the declared minimum.

4.1.2.11 Cell spacing

The manufacturer must declare the minimum inter cell spacing that is permitted.

For any product then manufactured within a BBIPV family, the inter cell spacing may be varied providing it is greater than the declared minimum.

4.1.2.12 Front Face Outer Coating

The coating on the outer surface of the module can be varied. Where the outer coating is varied, the technical file must be updated to include reference to the variation in the coating (e.g. self cleaning).

4.2 BBIPV test sample

The test samples for a BBIPV product family shall have the following characteristics

- The sample shall contain the maximum number of series connected cells as permitted under the BBIPV family (limited by string / module voltage, current or power maxima) - as described in section 4.3 of this document
- The sample shall have the cells located such that they are spaced from the edge of the sample at a distance equal to the minimum edge clearance as declared by the manufacturer - as described in section 4.3 of this document
- The sample shall have all cells spaced at the minimum cell spacing as declared by the manufacturer - as described in section 4.3 of this document
- Where the front face is glass, the sample shall utilise the thinnest glass as declared by the manufacturer - as described in section 4.3 of this document
- Where the rear face is glass, the sample shall utilise the thinnest glass as declared by the manufacturer - as described in section 4.3 of this document

4.3 BBIPV test requirements

With the exception of product marking requirements, the BBIPV test sample shall be tested to and comply with:

4.3.1 BBIPV products utilising crystalline silicon PV cells

- IEC61215 Crystalline Silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval
- IEC61730 Photovoltaic (PV) module safety qualification

4.3.2 BBIPV products utilising thin film PV technology

- IEC61646 Thin-film terrestrial photovoltaic (PV) modules – Design qualification and type approval
- IEC61730 Photovoltaic (PV) module safety qualification

4.4 Deflection test

The load test undertaken as part of IEC61215 or IEC61646 must include a measurement of the deflection of the BBIPV sample. This load test must result in a deflection equal or greater than the value declared by the manufacturer for the product family. In some cases this may require applying a load greater than is required in the standard IEC61215 or IEC61646 tests.

NOTE: All BBIPV products subsequently produced by the manufacturer will have to be designed such that the maximum unit deflection does not exceed the value declared for the BBIPV product family. This will be addressed by the manufacturer on a case by case basis, once the mounting method, unit size, orientation and dynamic loads are established for the project.

4.5 Generic standards

4.5.1 Glazing requirements

The manufacturer of a BBIPV product shall ensure all products within a product family comply with the following glazing standards (as applicable):

a) Glass to be in accordance with BS 952 and the relevant parts of:
- BS EN 572 for basic soda lime silicate glass – float (annealed).
- BS EN 1096 for coated glass
- BS EN 1863 for heat strengthened glass.
- BS EN 12150 for toughened glass.
- BS EN ISO 12543 for laminated glass
- BS EN 14179 for heat soaked toughened glass
- BS EN1991-1 (Eurocode) for the calculation of dead & live loads

b) Glazing shall be in accordance with BS 62662 and manufacturer's printed recommendations.

c) Safety glass to be tested in accordance with BS EN 12600

d) All safety glass to be suitable for applications as defined and recommended EN ISO 12543, Parts 1, 3, 4, 5 and 6, pr EN 12543 Part 2 and BS EN 1279 the Building Regulations, Local Authority requirements, other regulatory relevant Health and Safety requirements.

e) All safety glass to be marked or suitably labelled in accordance with internationally recognised standards, strictly in accordance with BS 62662 and BS EN 12600.

f) Marks, safety logos or similar to be universally and uniformly located at a consistent corner, and indicated on the drawings.

4.5.2 Building standards

Manufacturers must be able to demonstrate that they have a process in place such that all products are designed and constructed to meet the requirements within the relevant national Building Regulations or Standards applicable for the application that the product is intended.

In particular, all products must be designed and constructed with a consideration to the imposed static and live loads. This will require a consideration of the BBIPV product construction, the mounting method and arrangement and the loads imposed (wind, snow etc). Maximum deflection criteria will need to be studied as part of this analysis.

4.6 Design and product control requirements

4.6.1 Design control

The manufacturer shall be able to demonstrate to the MCS certification authority that they have procedures and processes in place to ensure:

a) That all products manufactured within the BBIPV product family are designed to meet the generic standards and requirements outlined in section 7 of this document.

b) That the products are designed such that they do not vary beyond the limited variations declared for that particular product family and remain within the permissible variations described earlier in this document

c) That for products with multiple strings all internal components and external components (bus bars, header bars, junction box, etc) are designed to meet the voltage and current characteristics of the product.

This shall include an ability to demonstrate that factors including (but not limited to) the intended mounting system, imposed loadings and permissible deflection for the product family have been met in addressing the BBIPV construction. This is of particular relevance when considering the glass thickness / composition for a particular project.

4.7 Quality and production control

The manufacturer shall demonstrate:

a) That all products manufactured within the BBIPV product family are manufactured to meet the generic standards and requirements outlined in this document.

b) That the products are manufactured such that they do not vary beyond the limited variations declared for that particular product family and remain within the permissible variations described earlier in this document.

c) Where the product family permits variations in glass thickness, the manufacturer shall have demonstrable systems to ensure that the lamination process is correctly adjusted to suit the changes.

Note: it expected that the method used by the manufacturer to demonstrate correct lamination will be covered by the controls they adopt in order to meet the requirements of BS EN ISO 12543

4.8 Product marking and Data

Each product shall be marked with the manufacturers name and a unique serial number. The marking shall be durable and remain legible over the design life of the product.

Each product shall have the polarity of all connections clearly marked. This can be achieved by cable colour coding or a suitable and durable mark on the cable connector or junction box.

A datasheet shall be provided for each module including the following details as a minimum:

a. Open circuit voltage (V_{OC}) under standard test conditions (stc)
b. Short circuit current (I_{SC}) stc
c. Voltage at Maximum Power (V_{MPP}) stc
d. Current at Maximum Power (I_{MPP}) stc
e. Maximum System Voltage (V) rating stc
f. Voltage temperature coefficient %/^{o}C and mV/^{o}C
g. Maximum Power (W_P)
h. Maximum Reverse Current (I_R)
i. Recommended Fuse Rating

Note: Where thin film or amorphous type technology is used then both pre annealed and post annealed data shall be provided.

5. TECHNICAL DOCUMENTATION

Technical documentation for the product must be submitted for review by the Certification Body and provided to the customer where noted. This documentation shall be presented in English and shall be such that it can be assured that the products submitted for test are equivalent to those that are to be manufactured for normal production. The documentation must consist of the following as a minimum;

Factory data for the Certification Body:

a) Details of intended use, application and classifications (if any) required
b) Manufacturing drawings and/or specifications including tolerances, issue and revision numbers
c) The revision number of the product.
d) Raw material and components specifications
e) Details of the quality plan applied during manufacture to ensure ongoing compliance
f) Where historical test data is requested to be considered for the application, full test report and details of any existing approvals (Note: each application will be dealt with on a case by case basis and further information about the acceptance of previous testing is available on request)
g) Installation, use and maintenance instructions
h) Sample product data sheet

Data for the Customer:

a) Details of intended use, application and classifications (if any) required
b) Fabrication drawings and/or specifications including tolerances, issue and revision numbers
c) Installation, use and maintenance instructions
d) Product data sheet

6. MAINTENANCE OF CERTIFICATION AND LISTING

Certificates and listing are maintained and held in force subject to satisfactory completion of the following requirements for maintenance of certification:

6.1 Factory audits

Certification is maintained through annual FPC quality system audits, which shall include a detailed check that the product being manufactured is to the same specification as the product tested.

6.2 Product audits

Product audits will be conducted as follows:

- review of the product technical data files including materials
- review of end of line tests in accordance with the manufacturer's quality plan
- repeat testing of elements from the product standard as appropriate to confirm that the product continues to meet the requirements for certification and listing.

7. CERTIFICATION MARK AND LABELLING

All approved products listed under this scheme shall be traceable to identify that they have (marked with a label to confirm that the product has) been tested and certificated in accordance with the requirements of the test standard. See below for details.

The Supplier shall use (the) Certification Mark(s) (only) in accordance with the Certification Bodies' instructions.

An example of the certification mark that can be used for this scheme is as follows:

Certificate Number MCS "XXX"

"Description of the Technology certificated"

Where 'XXX' is the certificate number and the logo of the certification body issuing the certification would sit in the right hand box.

Companies may only use the mark while the certification is maintained.

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AMENDMENTS ISSUES SINCE PUBLICATION

Document Number:	Amendment Details:	Date:
v1.0	First Issue	01/08/2011
v1.1	Updates to sections: • Revision to scope • 4.1 to include parameters which can be varied without impacting certification • Previous 4.1.3 removed	11/03/2015