



The Certification Mark for Onsite  
Sustainable Energy Technologies

## Microgeneration Installation Standard: MIS 3002

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# **REQUIREMENTS FOR CONTRACTORS UNDERTAKING THE SUPPLY, DESIGN, INSTALLATION, SET TO WORK COMMISSIONING AND HANDOVER OF SOLAR PHOTOVOLTAIC (PV) MICROGENERATION SYSTEMS**

Issue 1.6

This standard has been approved by the Steering Group of the MCS.

This standard was prepared by the MCS Working Group 2 'Solar Photovoltaic Systems'.

### **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](http://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.

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## FOREWORD

This standard identifies the evaluation and assessment practices to be undertaken by the certification bodies of the MCS for the purposes of approval and listing of contractors undertaking the supply, design installation, set to work, commissioning and handover of solar photovoltaic (PV) microgeneration systems. The listing and approval is based on evidence acceptable to the certification body:

- that the system or service meets the standard
- that the contractor has staff, processes and systems in place to ensure that the system or service delivered meets the standard

And on:-

- periodic audits of the contractor including testing as appropriate
- compliance with the contract for the MCS listing and approval including agreement to rectify faults as appropriate

This standard shall be used in conjunction with MCS 001 scheme document.

Government defines Microgeneration as the production of heat and/or electricity on a small-scale from a low carbon source. The various technologies have the potential to help us achieve our objectives of tackling climate change, ensuring reliable energy and tackling fuel poverty.

The objective of Government's Microgeneration strategy is to create conditions under which Microgeneration becomes a realistic alternative or supplementary energy generation source for the householder, for the community and for small businesses.

### NOTES:-

*Compliance with this Microgeneration Installation Standard does not of itself confer immunity from legal obligations.*

*Users of Microgeneration Installation Standards should ensure that they possess the latest issue and all amendments.*

*The Steering Group welcomes comments of a technical or editorial nature and these should be addressed to "The Secretary" at [mcs@gemserv.com](mailto:mcs@gemserv.com)*

*Listed products and services may be viewed on our website: [www.microgenerationcertification.org](http://www.microgenerationcertification.org)*

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## 1. SCOPE

This standard specifies the requirements of the MCS for contractors undertaking the supply, design, installation, set to work, commissioning and handover of solar photovoltaic (PV) microgeneration systems for permanent buildings.

## 2. DEFINITIONS

Contractor	An individual, body corporate or body incorporate, applying for or holding certification for the services detailed in the Scope, Clause 1, above.
Contract	A written undertaking for the design, supply, installation, set to work and commissioning of Microgeneration systems and technologies
Design	The formulation of a written plan including a specific list of products and fixings to form a completed system for a defined Microgeneration technology. Including extensions and alterations to existing Microgeneration systems.
Installation	The activities associated with placement and fixing of a Microgeneration system.
Set to work	The activities necessary to make the Microgeneration system function as a completed system.
Commissioning	The activities to ensure that the installed system operates within the boundaries and conditions of the design and the product manufacturers' claims.
Sub-contract	A written contract between a certificated contractor and another Firm for supply of products and services in connection with the fulfilment of a contract.
Handover	The point in a contract where commissioning and certification of the system have been satisfactorily completed to the contract specification so enabling the installation to be formally handed over to the client.

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## 3. REQUIREMENTS FOR THE CERTIFICATED CONTRACTOR

### 3.1 Capability

Certificated contractors shall have the capability and capacity to undertake the supply, design, installation, set to work, commissioning and handover of solar PV Microgeneration systems.

Where contractors do not engage in the design or supply of solar PV systems, but work solely as an installer for a client who has already commissioned a system design; then the contractor must be competent to review and verify that the design would meet the design requirements set out in this standard and this should be recorded.

### 3.2 Quality management system

Contractors shall operate a satisfactory quality management system which meets the additional requirements set out in the scheme document MCS 001.

### 3.3 Sub contracting

In installations for private customers, any work within the scope of the scheme not undertaken by employees of the Contractor shall be managed through a formal subcontract agreement between the two parties in accordance with the policies and procedures employed by the certificated Contractor. These procedures shall ensure that the subcontractor undertakes the work in accordance with the requirements of this standard.

In other situations (for example new build, or for commercial customers), it is permissible for the physical installation, setting to work and commissioning to be undertaken by others (i.e. not sub-contracted to the Contractor) provided that:

3.3.1 A contract between the Contractor and the commercial client details obligations on the client to include that evidence of skills and training of those employed by the client to do elements of work not undertaken by the Contractor are to be made available to the Contractor to ensure that the competence requirements of this standard are met and that access to the site for training and supervision in accordance with the following sections is agreed in advance.

3.3.2 The certificated Contractor provides additional product-specific training for those undertaking the work not undertaken by the certificated Contractor.

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3.3.3 The certificated Contractor assesses a sample number of installations under the contract which is not less than the square root of the number of installations rounded up to the nearest whole number (e.g. a new build site of 50 installations then a minimum of 8 are assessed).

3.3.4 The certificated Contractor assumes responsibility at handover that the installation is in full compliance with the standard.

### 3.4 Consumer code of practice

The Contractor shall be a member of and, when dealing with domestic consumers, comply with a code of practice (consumer code), which is relevant to the scope of their business in the Microgeneration sector and which is approved by the Office of Fair Trading (OFT). In the absence of any approved codes the MCS will accept codes that have completed stage 1 of the OFT approval process (e.g. REAL Code).

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## 4. DESIGN AND INSTALLATION REQUIREMENTS

### 4.1 Regulations

All applicable regulations and directives must be met in full. It should be noted that regulations that must be applied may be different in England and Wales, Scotland and Northern Ireland. Some guidance on applicable regulations is given in the guidance document MCS 002. This guidance is not necessarily exhaustive and may change from time to time. Certificated contractors must ensure they have a system to identify all applicable regulations and changes to them.

All work, and working practices, shall be in compliance with all relevant Health and Safety regulations and a risk assessment shall be conducted before any work on site is commenced.

### 4.2 Design and installation

Solar PV Microgeneration systems shall be designed and installed in accordance with the DTI guide; "Photovoltaics in Buildings – Guide to the installation of PV systems. 2<sup>nd</sup> Edition 2006" (DTI publication DTI/pub URN 06/1972), and paragraph 4.4 below.

In particular, attention is drawn to the unique combination of hazards associated with installation of PV systems highlighted in clause 1.3 of the above document. Furthermore an inverter supplied from a PV array must be connected via a dedicated circuit, to a spare fuseway in the main distribution unit, or to a fuseway in an additional dedicated distribution board.

For the purposes of this standard, all double-ticked items in the DTI guide are mandatory. Compliance with all single ticked items is also expected unless reasonable justification can be given.

### 4.3 System Performance

An estimate of annual energy performance shall be made using Appendix M of the Standard Assessment Procedure for Energy rating (SAP) methodology ([www.bre.co.uk/sap2005](http://www.bre.co.uk/sap2005)), taking account of the actual orientation, pitch and overshadowing conditions.

This estimate, shall be communicated with the client at or before the point that the contract is awarded and shall be accompanied by the following disclaimer:

*"The performance of solar PV systems is impossible to predict with certainty due to the variability in the amount of solar radiation (sunlight) from location to location and from year to year. This estimate is based upon the Government's standard assessment procedure for energy rating of buildings (SAP) and is given as guidance only. It should not be considered as a guarantee of performance."*

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Additional estimates may be provided using an alternative methodology but any such estimates must clearly describe and justify the approach taken and factors used and must not be given greater prominence than the standard SAP estimate. In addition, it must be accompanied by warning stating that it should be treated with caution if it is significantly greater than the result given by the standard method.

#### 4.4 Site specific issues

The following issues shall be addressed in the design of solar PV systems for each installation.

4.4.1 All contractors shall make their customers aware of all permissions and approvals required for the installation. The contractor shall assess the building using a qualified professional, experienced in photovoltaic systems as defined under item 5, to ensure that the site is suitable for the installation and that the building will meet the requirements of the building regulations and other applicable regulations applicable to their work during and following installation. Where required planning and/or building control approval should be obtained before work is commenced.

4.4.2 All roof penetrations (e.g. for PV modules, cables or bracketry) must be durably sealed using purpose-made products capable of accommodating the movement and temperatures to which they may be subjected.

*Note: In all circumstances the building's weather tightness must be maintained. Holes drilled through roofing felt and/or roof tiles/slates sealed with mastic or silicone sealant are not considered durable. Purpose-made roof tiles and flashings for the routing of cables from a PV module are examples of durable solutions.*

4.4.3 External metalwork used for bracketry or mounting frames shall be constructed to correctly support the imposed static and wind loads, must be adequately ballasted or fixed into a suitable structural member and shall be adequately protected from corrosion for a typical life to first maintenance of at least 20 years.

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(for example, stainless steel number 1.4301 or 1.4401 to EN 10088<sup>1</sup> or galvanised coating on mild steel as specified in EN ISO 14713:1999 for the appropriate environment, or equivalent)

4.4.4 The contractor shall ensure that the roof structure is capable of withstanding the loads (static and wind loads) that will be imposed by the PV modules and their mounting arrangements. If there is any doubt, a structural engineer must be consulted. Guidance on the mechanical installation and wind loads are given in BRE Digests 495 and 489 or BS 6399.

*Note: where a new roof incorporates new trussed rafters, the designer of those trussed rafters shall be advised of the position, number and weight of the PV modules to be mounted onto the roof structure.*

4.4.5 Adequate provision shall be made, for ventilation behind the PV modules to provide cooling, as required by the manufacturer.

## 4.5 Commissioning

The solar PV system shall be commissioned according to a documented procedure to ensure that the system is safe, has been installed in accordance with the requirements of this standard and the manufacturers' requirements, and is operating correctly in accordance with the system design. See also Clause 4 of the DTI guide; "Photovoltaics in Buildings - Guide to the installation of PV systems. 2<sup>nd</sup> Edition 2006".

## 4.6 Documentation

Certificated contractors shall provide customers with a comprehensive document pack which, as a minimum, includes the information given in Clause 4.5 of the DTI guide; "Photovoltaics in Buildings – Guide to the installation of PV systems. 2<sup>nd</sup> Edition 2006".

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<sup>1</sup> Steel No 1.4301 (ASTM Grade 304) and 1.4401 (ASTM Grade 316) are both suitable for rural, urban and light industrial sites and No 1.4401 (ASTM Grade 316) is also suitable for industrial and coastal sites.

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## 4.7 Equipment

When making installations in accordance with this standard the solar PV modules shall be listed under the MCS (<http://www.microgenerationcertification.org>).

Equipment should be suitable for its application and have a manufacturer's declaration of conformity for the appropriate standard.

## 5. COMPETENCE OF STAFF

All personnel employed by, or sub-contracted to the contractor must be able to demonstrate that they are trained and competent in the disciplines and skills, appropriate to the activities required for their role, in accordance with this standard.

Complete records of training and competence skills of personnel must be maintained by the certificated contractor, in particular:

- Design staff, carrying out full conceptual design, must be able to demonstrate a thorough knowledge of the technologies involved and the interaction of associated technologies.
- All personnel engaged in the actual installation are expected to have technical knowledge and installation skills, to install components and equipment within the designed system, in accordance with all appropriate codes of practice, manufacturer's specifications and regulations.
- All personnel engaged in the final inspection, commissioning, maintenance or repair, must have a comprehensive technical knowledge of the products, interfacing services and structures to complete the specified processes.

Examples of the underpinning knowledge areas required to show competence are given in Appendix A.

*Note: Due to the current development of the Sector Skills Agreement and the review in progress of the National Occupational Standards for this technology, the indicated suggested scope in the appendix "A", may change.*

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## 6. HANDOVER REQUIREMENTS

At the point at which the solar PV system is handed over to the client, the documentation as detailed in 4.6 shall be provided and explained along with:

- The maintenance requirements and maintenance services available;
- A certificate signed by the contractor containing at least the following:
  - a statement confirming that the solar PV system meets the requirements of this standard
  - Client name and address
  - Site address (if different)
  - Contractors name, address etc.
  - List key components installed
  - Estimation of system performance calculated according to 4.3

## 7. REGIONAL OFFICES

Where the firm wishes to design and commission under the Certification Scheme in regional offices, then these offices shall meet the requirements of this standard to be eligible for Certification.

## 8. PUBLICATIONS REFERRED TO

The following list implies the latest edition and amendments:

- Photovoltaics in Buildings – Guide to the installation of PV systems. 2nd Edition 2006 (DTI publication DTI/pub URN 06/1972). Available from [www.est.org.uk/housingbuildings/funding/solarpv/tradeguide/](http://www.est.org.uk/housingbuildings/funding/solarpv/tradeguide/)
- BRE Digest 489 Wind loads on roof-based photovoltaic systems. Available from: [www.brebookshop.com](http://www.brebookshop.com)
- BRE Digest 495 Mechanical installation of roof-mounted photovoltaic systems. Available from: [www.brebookshop.com](http://www.brebookshop.com)
- The Government's Standard Assessment Procedure for Energy Rating of Dwellings. Available from [www.bre.co.uk/sap2005](http://www.bre.co.uk/sap2005)
- EN ISO 14713:1999 Protection against corrosion of iron and steel structures – Zinc and aluminium coatings – Guidelines. Available from British Standards Institution (BSI): [www.bsi-global.com](http://www.bsi-global.com)
- EN 10088-1:2005 Stainless steels. List of stainless steels. Available from British Standards Institution (BSI): [www.bsi-global.com](http://www.bsi-global.com)

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- EN 12975-2:2006 Thermal solar systems and components – Solar collectors – Part 2 Test methods. Available from British Standards Institution (BSI):  
[www.bsi-global.com](http://www.bsi-global.com)
- BS 7671:2001 Requirements for Electrical Installations (IEE Wiring Regulations Sixteenth Edition). Available from British Standards Institution (BSI):  
[www.bsi-global.com](http://www.bsi-global.com) or [The Institution of Engineering and Technology \(IET\):  
www.theiet.org/publications/](http://TheInstitutionofEngineeringandTechnology(IET):www.theiet.org/publications/)
- G59/1 1991 ' Recommendations for the Connection of Embedded Generating Plant to the Public Electricity Suppliers' Distribution Systems'. Available from The Energy Networks Association, <http://www.energynetworks.org> .
- G83/1 2003 ' Recommendations for the Connection of Small-scale Embedded Generators (up to 16 A per phase) in parallel with Public Low-voltage Distribution Networks'. Available from The Energy Networks Association,  
<http://www.energynetworks.org>
- MCS 001 - MCS - Installer certification scheme document. Available from [www.microgenerationcertification.org](http://www.microgenerationcertification.org)
- MCS 002 - Guidance on regulations and directives for microgeneration installations. Available from [www.microgenerationcertification.org](http://www.microgenerationcertification.org)

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## APPENDIX A: QUALIFICATIONS OF STAFF

Assessments of competence will cover the following underpinning knowledge areas:

- Structural Engineering (understanding of static and wind uplift loads and impact on building structure)
- Roof work (understanding of roof construction and integrity issues such as rain penetration)
- Working at Height
- Solar Resource Assessment (especially shading issues)
- Non-conventional electrical properties (e.g. variable voltage according to module / ambient temperatures)
- DC Electrical systems
- Conventional AC Electrical Systems (BS 7671)
- Grid connection requirements (G83/1, G59/1)

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## AMENDMENTS ISSUED SINCE PUBLICATION

Document Number:	Amendment Details:	Date:
1.2	Amended 3.4 Consumer Code of Practice wording Updated e-mail and website addresses	25/02/2008
1.3	Gemserv details added as Licensee. Document reformatted to reflect brand update. References to BERR updated to DECC, MCS logo updated accordingly. Website and email addresses updated to reflect new name.	01/12/2008
1.4	Quality review	10/01/2009
1.5	MCS Mark Updated	25/02/09
1.6	Additional contacting options were added to clause 3.3. As agreed in the MCS Steering on 27/10/2009.  References to Clear Skies have been removed from clause 4.7 and a link to the MCS website added.	28/01/2010