

# **Microgeneration Installation Standard**



**MIS 3001: ISSUE 1.2, 25/02/08**

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

This standard specifies the requirements of the Department for Business Enterprise and Regulatory Reform (BERR) Microgeneration Certification Scheme for Contractors undertaking the supply, design, installation, set to work, commissioning and handover of solar heating microgeneration systems.

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

This standard was prepared by the Microgeneration Certification Scheme Working Group 1 'Solar Heating 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.eu](http://www.microgenerationcertification.eu)

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 Microgeneration Certification Scheme (MCS) for the purposes of approval and listing of contractors undertaking the supply, design installation, set to work, commissioning and handover of solar heating 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 [microgeneration@bre.co.uk](mailto:microgeneration@bre.co.uk).

Listed products and services appear in the "Green Book " which may be viewed on the website: [www.greenbooklive.com](http://www.greenbooklive.com).

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## **1 SCOPE**

This standard specifies the requirements of the Microgeneration Certification Scheme (MCS) for Contractors undertaking the supply, design, installation, set to work, commissioning and handover of solar heating systems to supply domestic hot water, space heating and swimming pools for permanent buildings.

## **2 DEFINITIONS**

- 2.1 Contractor - an individual, body corporate or body incorporate, applying for or holding certification for the services detailed in the Scope, Clause 1, above.
- 2.2 Contract – a written undertaking for the design, supply, installation, set to work and commissioning of Microgeneration systems and technologies
- 2.3 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.
- 2.4 Installation – the activities associated with placement and fixing of a Microgeneration system.
- 2.5 Set to work – the activities necessary to make the Microgeneration system function as a completed system.
- 2.6 Commissioning – the activities to ensure that the installed system operates within the boundaries and conditions of the design and the product manufacturers' claims.
- 2.7 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.
- 2.8 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.

## **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 heating Microgeneration systems.

Where contractors do not engage in the design or supply of solar heating systems, but work solely as an installer for a client who has already commissioned a system design; then the contractor shall 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.

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### 3.3 Sub contracting

Any elements of the work that are subcontracted 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.

### 3.4 Consumer code of practice

The Contractor shall be a member of and, when dealing with domestic consumers, shall 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)

## **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 shall ensure they have a system to identify all applicable regulations and changes to them.

All work, and working practices, must 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

The following principles shall be met when designing, specifying and installing a solar heating system. For the principles numbered 4.3.1 to 4.3.13, one means of compliance would be to follow the guidance in Energy Saving Trust publication CE131: Solar water heating systems – guidance for professionals, conventional indirect models.

### 4.3 Safety and durability

Systems shall:

- 4.3.1 incorporate appropriate measures to prevent stored water exceeding 100°C (in accordance with the Water Supply (Fittings) Regulations 1999)

*Note: this requirement would be met through the use of appropriate vent pipes, temperature control devices and other safety devices. For unvented storage see 4.3.11.*

- 4.3.2 safeguard against pressures exceeding the pressure rating of the weakest component.

*Note: for open vented primary solar circuits, this requirement would be met provided there was no possibility of the vent route becoming obstructed. Any means of over pressure control (e.g. pressure relief valve) must be set lower than the maximum pressure rating of the weakest component in the system. The discharge points from protection devices and open vents must be in a safe location to minimise any risk of*

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- injury to people or damage to property.*
- 4.3.3 incorporate a means to limit the water at all points of use to no more than 60°C or lower depending upon scald risk factors.
- Note: this requirement would be met through the provision of thermostatic mixing valves (TMVs) within 2000mm of all points of use set at no more than 46°C (or lower dependent upon the point of use in question) OR the provision of TMVs at the outlets from the hot water cylinder set at 55°C – 60°C OR the provision of a thermostatic device to limit the solar input to the hot water cylinder OR a combination of the above.*
- 4.3.4 incorporate a means to prevent bacterial growth (legionella) at all foreseeable flow rates.
- Note: one way of meeting this requirement would be through the use of a secondary means of heating the water to 60°C.*
- 4.3.5 ensure that future performance and safety are not significantly affected by lime scale forming in the solar primary circuit.
- Note: this requirement is met by indirect systems where fresh water is not continually being introduced to the solar primary circuit.*
- 4.3.6 incorporate appropriate means to protect the solar system from damage due to freezing.
- 4.3.7 ensure all components, including pipe work, joints, insulation and pipe supports are not exposed to temperatures outside their designed temperature range.
- Note: many standard heating components may not be suitable for the temperatures and pressures present in solar primary circuits.*
- 4.3.8 be designed such that there is auto-resume of normal operation after stagnation without user intervention (often referred to as “intrinsically secure”).
- Note: stagnation can be defined as a state whereby flow within the primary solar circuit stops whilst the collector is still exposed to solar radiation. Stagnation can occur through purposeful temperature control of the water in the hot water cylinder or through a system fault (e.g. pump or electrical failure). On sealed systems, this requirement would be met through the provision of sufficient capacity in an expansion vessel to accommodate the volume of any vapour created within the collector and connected pipe work along with the provision of a valve left in the closed position before any automatic air vent.*
- 4.3.9 be installed such that all manufacturer's instructions are followed.
- 4.3.10 ensure the supply of pre-heated water to the cold inlet of combination boilers does not take place unless written instructions for this type of duty are provided by the boiler manufacturer, those written instructions are followed in full and left on site for the user.
- Note: The pre-heating of combination boilers (or any instantaneous water heater) without explicit written instructions from the boiler manufacturer indicating how this should be achieved for the model in question is not permitted.*

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- 4.3.11 incorporate a manual reset limit thermostat on unvented cylinders in order to control the solar primary circuit in such a way that the addition of heat is prevented when the temperature of stored water in the cylinder reaches 85°C.

*Note: This manual reset limit thermostat is in addition to any thermostatic control required to comply with 4.2.3. Furthermore, this manual reset limit thermostat does not on its own completely satisfy Building Regulations G3 which must be complied with in full.*

- 4.3.12 be designed and installed to allow for safe de-commissioning.

*Note: this requirement is UNLIKELY to be met without the provision of sufficient, suitably located, drain points to allow draining of all parts of the system (primary and secondary circuits).*

- 4.3.13 ensure that all pipes are lagged / insulated to protect against burns and unnecessary heat loss.

*Note: This includes all of the pipes in the solar primary circuit, except the branch pipe to an expansion vessel. It also includes all other pipes connected to the hot water cylinder (boiler primary and hot water draw off), as far as is reasonably practicable, but in any event it must include at least the first 1 metre of any pipe from the hot water cylinder. This clause does not require the insulation of components which should not be insulated .*

#### 4.4 System Performance

Systems shall:

- 4.4.1 be designed and installed to prevent the export of energy from the hot water cylinder added by any auxiliary or secondary heat source.

*Note: the system must not use heat export as a freeze control strategy.*

- 4.4.2 be designed and installed such that any auxiliary heating system have a control interlock wherever possible.

*Note: an interlock is where the controls are wired so that when there is no demand for heat for either space heating or hot water the auxiliary heating appliance and pump are switched off. This requirement would NOT be met where a boiler capable of being fully interlocked is left relying on gravity to supply heat to the hot water cylinder.*

- 4.4.3 be designed and installed in accordance with the most current draft of the Domestic Heating Compliance Guide (DHCG) as published by Communities and Local Government.

*Note: alternative methods of achieving the same minimum level of system performance as a DHCG compliant system can be considered at the discretion of the Certification Body. For consideration an independent third party technical paper should be submitted for review. The Certification Body reserve the right to charge an appropriate fee for that review.*



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4.4.4 be accompanied by an estimate of annual energy performance calculated as follows:

- for domestic installations, using Appendix H of the Standard Assessment Procedure for Energy rating (SAP) methodology ([www.bre.co.uk/sap2005](http://www.bre.co.uk/sap2005)). This estimate, shall be communicated with the client at or before the contract is awarded and shall be accompanied by the following disclaimer:

*"The performance of solar heating 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."*

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.

- For non-domestic installations, a performance calculation using proprietary software is permitted. This information should be communicated with the client at or before the point that the contract is awarded.

#### 4.5 Site specific issues

The following issues shall be addressed in the design of solar heating systems for each installation:

- 4.5.1 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 solar heating systems 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.
- 4.5.2 All roof penetrations (e.g. for the collector, pipework, cables or bracketry) shall 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 weathertightness 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 pipes from a collector are examples of durable solutions.*

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4.5.3 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. (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).

4.5.4 The contractor shall ensure that the roof structure is capable of withstanding the loads (static and wind loads) that will be imposed by the solar collectors and their mounting arrangements. If there is any doubt, a structural engineer must be consulted.

*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 solar collectors to be mounted onto the roof structure.*

#### 4.6 Commissioning

The solar heating 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.

*Note: Guidance on appropriate system checks is given in the Energy Saving Trust publication CE131.*

#### 4.7 Documentation

Certificated contractors shall provide customers with a comprehensive document pack which, as a minimum, includes the following:

- details of the actual collector installed to include:
  - the manufacturer's name
  - type and model numbers
  - serial numbers
  - total aperture area
  - Zero loss collector efficiency ( $\eta_o$ ) from EN 12975 test report
  - Collector heat loss coefficient ( $a_1$ ) from EN 12975 test report
- details of the actual hot water cylinder installed to include:
  - the manufacturer's name
  - model number
  - total volume (V)
  - volume of the dedicated solar volume ( $V_s$ )
  - surface area of solar heat exchange coil
  - surface area of any auxiliary heat exchange coils
  - maximum working pressure of each heat exchange coil
- an 'as fitted' system schematic plan of both plumbing and electrical systems - detailing all functioning components of the Solar Heating system up to the point of integration with backup heat source input to storage vessel.

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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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- a warning of the risk of bacterial growth within the hot water cylinder, how this should be controlled and if in doubt to seek specialist advice.
- a note explaining the presence of the temperature controls in the system and their purpose in preventing scald injuries.
- an explanation of any user actions (including frequency) necessary to maintain lime scale protection devices.
- where applicable, manufacturer's instructions for any combination boiler other instantaneous water heater supplied with pre-heated water from the solar heating system.
- the procedure for the safe decommissioning of the solar heating system including appropriate warnings.
- details of the methods employed to control damaging effects of freezing along with the lowest temperature these methods protect to. The method and frequency of maintaining this protection (where required) should also be stated.
- all manufacturer documents and warranties relating to any installed equipment.
- any system commissioning checklists and certificates.
- Any routine maintenance required by the user.
- installer contact details and warranty.

#### 4.8 Equipment

When making installations in accordance with this standard the solar collectors used in installations shall be listed by one of the following schemes:

- the Microgeneration Certification Scheme
- **Non-roof-integrated** products with the CEN Keymark for Solar Thermal Products ([www.estif.org/solarkeymark/productsandcertificates.php](http://www.estif.org/solarkeymark/productsandcertificates.php))
- And during the transition period, the Clear Skies list (<http://www.clear-skies.org/households/RecognisedProducts.aspx>)

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

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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 qualifications that may be suitable for satisfying some of the training requirements 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.*

## **6. HANDOVER REQUIREMENTS**

At the point at which the solar heating system is handed over to the client, the documentation as detailed in 4.7 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 thermal 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 4.4.4

## **7. REGIONAL OFFICES**

Where the contractor 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:

- CE 131 – Solar Water Heating Systems, guidance for professionals, conventional indirect models. Available from The Energy Saving Trust: [www.greenspec.co.uk/documents/energy/EST-solarWaterHeating.pdf](http://www.greenspec.co.uk/documents/energy/EST-solarWaterHeating.pdf)
- The Government's Standard Assessment Procedure for Energy Rating of Dwellings. Available from: [www.bre.co.uk/sap2005](http://www.bre.co.uk/sap2005)
- Domestic Heating Compliance Guide – Available from: [www.ribabookshops.com](http://www.ribabookshops.com)
- 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)
- 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)

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- MSC 001 – Microgeneration Certification Scheme - Installer certification scheme document. Available from [www.microgenerationcertification.eu](http://www.microgenerationcertification.eu)
- MCS 002 – Guidance on regulations and directives for microgeneration installations. Available from [www.microgenerationcertification.eu](http://www.microgenerationcertification.eu)
- Water Supply (Fittings) Regulations 1999 – Available from: [www.opsi.gov.uk](http://www.opsi.gov.uk)

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#### **APPENDIX A Qualifications of staff**

The following qualifications may be suitable to satisfy the requirements detailed under item 5:

- NVQ Level 2 plumbing or H&V (Domestic) or equivalent
- Part P for electrical works, limited scope or above
- Recognised solar system design and installation course

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**Amendments Issued Since Publication**

DOCUMENT NO.	AMENDMENT DETAILS	DATE
MIS3001 Issue 1.2	Amended 3.4 Consumer Code of Practice wording	25/02/08
	Updated e-mail and website addresses	25/02/08