



The Certification Mark for Onsite
Sustainable Energy Technologies

Microgeneration Installation Standard: MIS 3007

REQUIREMENTS FOR CONTRACTORS UNDERTAKING THE DESIGN, SUPPLY, INSTALLATION, SET TO WORK, COMMISSIONING AND HANDOVER OF A HEATING SYSTEM CONTAINING A MICRO-COGENERATION PACKAGE

Issue 1.1

This document was prepared by the Microgeneration Certification Scheme Working Group 7 'Micro-CHP systems'.

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

REVISION OF MICROGENERATION INSTALLATION STANDARDS

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.

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FOREWORD

This document identifies the evaluation and assessment practices undertaken by certification bodies of the Microgeneration Certification Scheme (MCS) for the purposes of approval and listing of contractors undertaking the design, supply, installation, set to work, commissioning and handover of a heating system containing a micro-cogeneration package. The listing and approval is based on evidence acceptable to the certification body:

- that the contractor has staff, processes and systems in place to ensure that the system or service delivered will meet the requirements of this standard

And on:

- periodic audits of the Contractor including testing as appropriate; and
- 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 document MCS 001 (see Ref. [7.1]).

NOTES:-

This Installation Standard makes use of the terms ‘must’, ‘shall’ and ‘should’ when prescribing certain requirements and procedures. In the context of this document:

- *The term ‘must’ identifies a requirement by law at the time of publication*
- *The term ‘shall’ prescribes a requirement or procedure that is intended to be complied with in full and without deviation*
- *The term ‘should’ prescribes a requirement or procedure that is intended to be complied with unless reasonable justification can be given*

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

The Steering Group welcomes comments of a technical or editorial nature and these should be addressed to “the Secretary” at mcs@gemserv.com

Listed products and services appear at www.microgenerationcertification.org .

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

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1. SCOPE

This standard specifies the requirements of the Microgeneration Certification Scheme (MCS) for the approval and listing of Contractors undertaking the design, supply, installation, set to work, commissioning and handover of a heating system containing a micro-cogeneration package.

The micro-cogeneration packages covered by this standard are those described in the MCS Product Certification Scheme requirements MCS 014 (see Ref. [7.2])

2. DEFINITIONS

Commissioning	The activities to ensure that the installed system operates within the boundaries and conditions of the design and the product manufacturers' claims.
Contract	A written undertaking for the design, supply, installation, set to work, commissioning and handover of a heating system containing a micro-cogeneration package.
Contractor	An individual, body corporate or body incorporate, applying for or holding certification for the services detailed in the Scope, Clause 1, above.
Design	The formulation of a written plan including a specific list of products and fixings to form a completed heating system containing a defined heat-led micro-cogeneration package installation in a dwelling.
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.
Installation	The activities associated with placement and fixing of a heating system containing a heat-led micro-cogeneration package.
Set to work	The activities necessary to make the heating system containing a heat-led micro-cogeneration package system function as a completed system.
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.

3. REQUIREMENTS FOR THE CERTIFICATED CONTRACTOR

3.1 CAPABILITY

The Contractor shall have the capability to undertake the design, supply, installation, set to work, commissioning and handover of the heating system containing the micro-cogeneration package.

Where Contractors do not engage in the design or supply of such 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 will meet the design requirements set out in this scheme document 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 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), (e.g. REAL Assurance Scheme Consumer Code {see Ref. [7.4]}).

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4. DESIGN AND INSTALLATION, SET TO WORK, COMMISSIONING, HANDOVER AND EQUIPMENT 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 (see Ref. [7.5]). 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 areas of competence relevant to the design and installation of heat-led micro-cogeneration package systems in dwellings are included in Clause 5. The following principles shall be met when selecting, designing, specifying and installing such systems.

4.2.1 The environmental performance of the micro-cogeneration package shall be equal or better than would be achieved by a boiler using the same fuel. This shall be determined by the method set out in Appendix B.

4.2.2 The design of the heating system shall ensure that it complies with the following fundamental assumptions:

- a) The micro-cogeneration package is the primary heating system for the dwelling (ie, it will produce at least 50% of the annual heating and hot water demand);
- b) It is acting as a boiler substitute;
- c) Water heating service throughout the year is included, unless the package is declared unsuitable for water heating;
- d) The package is controlled by heat demand (i.e. it is “heat-led”);

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- e) Heat is never wasted; and
- f) Electricity is never wasted, and any that is not used in the dwelling is always exported to the grid.

4.2.3 The design of the micro-cogeneration package system shall be in compliance with the micro-cogeneration package manufacturer’s specification and shall be clearly documented so that such compliance may be demonstrated.

4.2.4 The micro-cogeneration package system shall be installed such that all the manufacturer’s instructions are followed.

4.2.5 The micro-cogeneration package shall be connected to the domestic electrical installation (in parallel with the mains supply) by following the appropriate guidance contained in the Guide prepared by the Electrical Safety Council “Connecting a microgeneration system to a domestic or similar electrical installation (in parallel with the mains supply)” (see Ref. [7.9]).

4.2.6 a) For new build the Contractor shall provide evidence of consultation and compliance with the requirements of the designers and installers of the building’s heat distribution system (and hot water system if applicable) regarding specification and performance to ensure the correct and efficient operation of the system as a whole. This shall cover the selection of a micro-cogeneration package of appropriate output for the building, and the design of heat distribution systems and controls compatible with efficient operation.

b) When replacing an existing heating system the Contractor shall provide evidence that the micro-cogeneration package selected is of appropriate output for the building, (and hot water system if applicable), and that the design of the heat distribution systems and controls is compatible with efficient operation of the package.

4.3 SET TO WORK & COMMISSIONING

The micro-cogeneration package system shall be commissioned according to the manufacturer’s requirements.

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4.4 HANDOVER

Contractors shall provide the client with a comprehensive document pack and that pack should contain at least:

- The system maintenance requirements and the maintenance services available;
- The micro-cogeneration package manufacturer's User and Installation and Service Instructions;
- A certificate signed by the contractor containing at least the following:
 - a statement confirming that the micro-cogeneration package system installation meets the requirements of this standard;
 - Client name and address;
 - Site address (if different);
 - Contractors name, address etc.;
 - List of key components installed; and
 - A description of the system performance including those parameters applicable to the specific installation listed in 4.2.2.

4.5 EQUIPMENT

When making installations in accordance with this standard the micro-cogeneration package used in installations shall be listed under the MCS (<http://www.microgenerationcertification.org>). .

All micro-cogeneration packages that are installed within the European Union must be CE marked in compliance with the relevant European Directives. These are listed in MCS 002.

5. COMPETENCE OF STAFF

All personnel employed by, or sub-contracted to, the Contractor shall 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 shall be maintained by the certificated contractor, in particular:

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- Design staff, carrying out full conceptual design, shall 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; and
- All personnel engaged in the final inspection, commissioning, or repair shall 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 the training requirements are listed 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.

For personnel employed in the installation of micro-cogeneration packages assessments of training and competence will cover the following underpinning knowledge areas:

- Health and Safety knowledge and awareness including risk assessments;
- Energy conservation including the requirements of the Building Regulations Schedule 1 Part L for new and existing buildings;
- Assessment of the suitability of a heat-led micro-cogeneration package system for the building and the efficient operation of its heating system (and hot water system if applicable);
- Calculation of building heating requirements (including heat losses and the effects of insulation);
- After-sales service and warranty;
- Awareness of different electricity tariffs;
- Fault diagnosis;
- Performance data to be supplied;
- Commissioning;

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- Environmental considerations – e.g. minimising risk of nuisance from noise and combustion products;
- How heat-led micro-cogeneration packages work – principles and components;
- Electrical connections – e.g. Competent Persons Scheme *Electrical Safety in dwellings* (see Ref. [7.10]);
- Plumbing connections – e.g. Competent Persons Scheme *Heating and Hot Water Service Systems (Dwellings)* see Ref. [7.10]); and
- For internal combustion engine and Stirling engine packages – the IGEM standard IGE/UP/3 Edition 2 *Gas fuelled spark ignition and dual fuel engines* (see Ref. [7.11]); and the relevant Nationally Accredited Certification Scheme Module for Individual Gas Fitting Operatives (ACS Module) (see Ref. [7.12]).

6. REGIONAL OFFICES

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

7. PUBLICATIONS REFERRED TO

In the following list reference to undated publications implies the latest edition and amendments:

[7.1] MCS 001- Microgeneration Certification Scheme – Installer certification scheme document - Available from www.microgenerationcertification.org

[7.2] MCS 014 – Microgeneration Certification Scheme - Product certification scheme requirements *Heat-led micro-cogeneration packages in dwellings* - Available from www.microgenerationcertification.org

[7.3] PAS 67: 2008 – Publicly Available Specification 67 - Laboratory tests to determine the heating and electrical performance of heat-led micro-cogeneration packages primarily intended for heating dwellings – Available from BSI Customer Services Tel: +44 (0)20 8996 9001.

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[7.4] REAL Assurance Scheme Consumer Code – see <http://www.realassurance.org.uk/about-the-code>

[7.5] MCS 002 – Guidance on regulations and directives for Microgeneration installations - Available from www.microgenerationcertification.org

[7.6] The Boiler Efficiency Database – see www.sedbuk.com

[7.7] *Method to evaluate the annual energy performance of micro-cogeneration heating systems in dwellings*, 9 October 2008. Prepared for Sustainable Energy Policy Division, Defra, by John Hayton and Bruce Young, BRE. Available from: <http://projects.bre.co.uk/SAP2005/supporting-technical-documents.html>

[7.8] SAP - *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* – 2005 Edition – see <http://projects.bre.co.uk/sap2005/pdf/SAP2005.pdf>

[7.9] “*Connecting a microgeneration system to a domestic or similar electrical installation (in parallel with the mains supply)* – Best Practice Guide produced by the Electrical Safety Council – see http://rexel.tamba.co.uk/client_files/File/NE/BestPracticeGuide3.pdf

[7.10] Competent Persons Scheme *Electrical Safety in dwellings* AND Competent Persons Scheme *Heating and Hot Water Service Systems (Dwellings)* – see <http://www.communities.gov.uk/planningandbuilding/buildingregulations/competentpersonsschemes/existingcompetentperson/>

[7.11] IGE/UP/3 Edition 2 *Gas fuelled spark ignition and dual fuel engines* – see <http://www.igem.org.uk/technical/publications.asp?mci=4>

[7.12] ACS Module CGFE1 (Commercial Gas Fired Engines)

[7.13] *Domestic Heating Design Guide* published by CIBSE

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APPENDIX A: QUALIFICATIONS OF STAFF

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

- Accreditation from a relevant training course – relevance of the course would require independent verification.
- Membership of a relevant Competent Person Scheme – relevance of the Competent Person Scheme would require independent verification.
- Micro-cogeneration package manufacturer’s product training – Would be product specific and require independent verification.
- Experience gained through a mentoring process – would require independent verification.
- Demonstrable track record of successful installation – would require independent verification.

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APPENDIX B: ENVIRONMENTAL PERFORMANCE

B.1 Standard of comparison

B.1.1 The environmental performance of the micro-cogeneration package shall be evaluated and compared with that of a boiler using the same fuel.

B.1.2 For a micro-cogeneration package fuelled by natural gas, LPG, or oil, the standard for comparison shall be a boiler using the same fuel with a SEDBUK efficiency of 86%, representative of good quality products readily available in the market.

B.1.3 For a micro-cogeneration package not covered by B.1.2, the standard for comparison shall be a boiler using the same fuel and compliant with building regulations in respect of energy performance.

B.1.4 Performance shall be established by either the SAP method described in B.2 or the HPER method described in B.3. For new dwellings, the SAP method shall be used. For existing dwellings in which the micro-cogeneration package is fuelled by natural gas, LPG, or oil, either the SAP method or the HPER method may be used. For existing dwellings in which the micro-cogeneration package uses a fuel other than natural gas, LPG, or oil, the SAP method shall be used.

B.1.5 When communicated to the client, the estimate of performance shall be accompanied by the following disclaimer:

'The performance of Micro-cogeneration systems is difficult to predict with certainty due to the variability of customer expectations and usage and the subsequent effect on both heat demand and electricity supply and demand. This estimate is based upon the best available information but is given as guidance only and should not be considered as a guarantee.'

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B.2 The SAP method

B.2.1 The measure of environmental performance is the Dwelling CO₂ Emission Rate (DER), expressed in units of kgCO₂/m²/year to two decimal places, as calculated by the current version of SAP (see Ref [7.8]). SAP assessments of the dwelling in which the micro-cogeneration package is to be installed shall be carried out by a qualified SAP assessor.

B.2.2 The SAP assessment shall be carried out for the particular micro-cogeneration package (identified by manufacturer, brand, and model name) to be installed. This can be done only if the micro-cogeneration package has previously been registered in the Boiler Efficiency Database (Ref. [7.6]). If the micro-cogeneration package is not intended to provide hot water service then the specification of the alternative hot water system to be installed in the dwelling should be used in the SAP assessment. If the specification of the hot water system to be installed in the dwelling is not known then an electric resistance heated hot water storage system of suitable size must be assumed. The DER produced by the SAP assessment shall be recorded.

B.2.3 A second SAP assessment for the same building shall be carried out in which a boiler is substituted for the micro-cogeneration package, using the same fuel. The energy performance of the boiler shall meet the requirements of B.1.2 or B.1.3 as appropriate. The boiler, which may be a combi boiler, shall also be specified as providing hot water service. No other changes to the data for the SAP assessment are allowed. The DER produced by SAP shall be recorded.

B.2.4 If the DER for the SAP assessment with the micro-cogeneration package is less than or equal to the DER for the SAP assessment with the boiler, the environmental performance of the micro-cogeneration package may be regarded as acceptable for the purpose of the MCS Scheme.

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B.3 The HPER method

B.3.1 The measure of environmental performance is the Heating Plant CO₂ Emission Rate (HPER) in units of kgCO₂/kWh. Calculation of the HPER requires:

- the design heat loss of the dwelling in Watts
- the nominal rated heat output of the micro-cogeneration package in Watts (and confirmed by PAS-67 tests)
- the plant size ratio (as calculated in B.3.3)
- the independently verified micro-cogeneration package annual energy data provided by the manufacturer, obtained from test results in accordance with PAS-67 (Ref. [7.3]) and the annual performance method (Ref. [7.7]). *Note - it is preferable to take the annual energy data from the Boiler Efficiency Database (Ref. [7.6]) as this has been independently verified by the Boiler Database administrator.*

B.3.2 The design heat loss of the dwelling shall be estimated using one of the following procedures:

(i) *The Whole House Boiler Sizing Method for houses and flats.* This is an interactive calculator available under “Recommended boiler size” at www.sedbuk.com (Ref. [7.6]). It is also available in printable form at www.energysavingtrust.org.uk/housingbuildings/publications/ - search for publication reference CE54. The design heat loss in Watts shall be taken as the sum of boxes E and F only (the additional figure for water heating in section 7 is ignored).

(ii) “The Domestic Heating Design Guide” published by CIBSE (Ref [7.13]). The design heat loss is calculated on Worksheet 1 in Appendix F as the sum of the heat losses from each room, with final adjustments for exposed location, high ceilings, etc.

(iii) The HHIC Heat loss calculator & Radiator Selector published by the Heating and Hotwater Industry Council. The design heat loss is calculated as the sum of the heat losses from each room. See:

http://www.centralheating.co.uk/index/fuseaction/site.articleDetail/con_id/5528

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B.3.3 The plant size ratio shall be calculated as the nominal rated heat output of the micro-cogeneration package in Watts divided by the design heat loss in Watts.

B.3.4 The HPER shall be determined for the particular micro-cogeneration package and plant size ratio. This shall be done either by:

(i) Calculation by the annual performance method (Ref. [7.7]), using data from PAS-67 tests; or

(ii) Finding the HPER from the relevant entry in the Boiler Efficiency Database for the nearest plant size ratio below, and nearest plant size ratio above, and linear interpolating for the plant size ratio that applies to the particular dwelling in which the micro-cogeneration package is to be installed.

B.3.5 To be acceptable for the purposes of the Microgeneration Certification Scheme the HPER shall be $\leq 0.230 \text{ kgCO}_2/\text{kWh}$

Note: A HPER of $0.230 \text{ kgCO}_2/\text{kWh}$ is considered to be equivalent to a gas boiler of SEDBUK efficiency of 86% with a plant size ratio of 1.5 and has been derived from a combination of experimental and analytical work.

This figure has been calculated using CO₂ emission figures for gas and electricity taken from Table 12 of SAP 2005, and is subject to change in future versions of SAP.

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AMENDMENTS ISSUED SINCE PUBLICATION

Document Number:	Amendment Details:	Date:
1.0	First Issue	10/07/09
1.1	<p>Additional contacting options were added to clause 3.3. As agreed in the MCS Steering on 27/10/2009.</p> <p>References to Clear Skies have been removed from clause 4.5 and a link to the MCS website added.</p>	28/01/2010