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MCS 2025

Micro CHP: Installation Standard

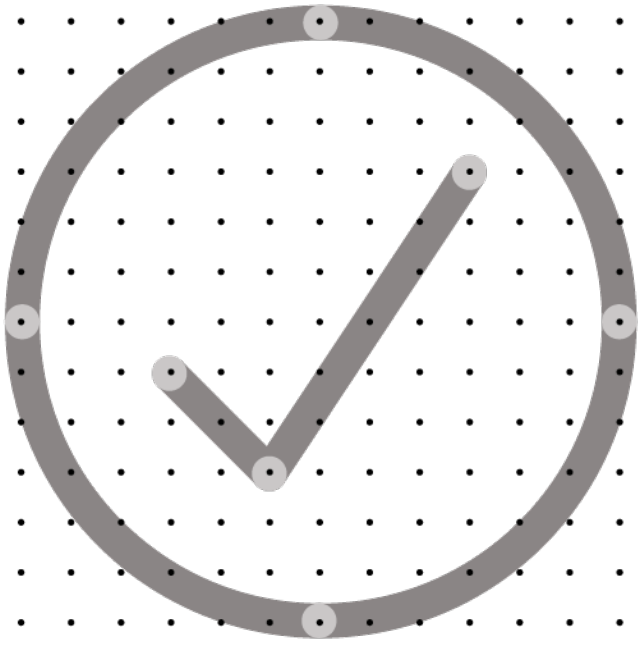

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TABLE OF CONTENTS

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ABOUT MCS

MCS: Giving everyone confidence in home-grown energy

With energy costs constantly rising and climate change affecting us all – low-carbon technology has a bigger and bigger role to play in the future of UK energy. MCS is here to ensure it's a positive one.

MCS is the UK's quality mark for small-scale renewable energy technologies like solar PV, solar heating, heat pumps, biomass, and battery storage. We have two main roles – setting and maintaining standards, and providing consumer protection.

Our Standards define how certified renewable energy installations should be designed and installed using MCS certified products. They are a benchmark for quality developed in close consultation with industry through independent technical working groups.

The Standards are owned by The MCS Foundation (a charitable trust), but maintained and developed by MCS.

www.mcscertified.com

CHANGES TO STANDARDS

When MCS Standards are revised, the issue number is also revised to indicate the nature of the changes. This can either be a whole new issue or an amendment to the current issue. Details will be posted on the website at www.mcscertified.com

Technical or other significant 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 is given on the left of the decimal point, and the amendment number on the right. For example, issue 3.2 indicates that it is the third significant version of the document which has had two sets of minor amendments.

Users of this Standard should ensure that they are using the latest issue.

Amendments issued since publication

Issue No.	Amendment details	Date
1.0	First publication for MCS:2025 1.0	01/01/2025

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FOREWORD

Compliance with this Standard is mandatory for MCS Contractors certified to MCS: 2025.

The purpose of this Standard is to specify best practice in achieving high-quality low carbon technology installations. Whilst it is not possible to ensure safety, this Standard provides requirements which should help mitigate potential safety risks associated with the design and installation of this technology.

This document contains references to other documents which may be either normative or informative. At the time of publication any editions of those documents, where indicated, were valid. However, as all documents are subject to revision, any users of this document should apply the most recent editions of those referenced documents (unless a dated version is specified).

NOTE:
This MCS 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 MCS Installation Standard does not in itself confer immunity from legal obligations.

1 PURPOSE & SCOPE

This Standard specifies the requirements for MCS contractors undertaking the supply, design, installation, set to work and commissioning of micro-combined heat and power (micro-CHP) appliances for permanent buildings and connected in parallel to the electricity distribution network.

2 DEFINITIONS

Refer to Installer Operating Requirements for general definitions (not specific to micro-CHP).

For technical definitions please see below.

Term	Definition
Micro-Cogeneration Package	Micro-Cogeneration Unit with associated equipment as specified by the manufacturer when submitting for testing.
Add-on-Micro-Cogeneration Unit	A lead device added to or replacing part of the building's existing heating system which responds to a thermal or electrical demand signal and controls operation of the existing heating plant as necessary to meet the building's heat requirements.
combiPK	A Micro-Cogeneration Package for space and water heating in which the Domestic Hot Water (DHW) service is provided wholly from within the package.
DHWPK	A Micro-Cogeneration Package for the provision of hot water heating alone for residential or commercial buildings.

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3 DESIGN & INSTALLATION REQUIREMENTS

3.1 LEGISLATION

3.1.1 All applicable legislation must be met in full.

Note: the legislation which applies may be different in England, Wales, Scotland and Northern Ireland.

3.1.2 The contractor shall ensure the building is assessed by a competent professional experienced in micro-CHP systems to ensure that it is suitable for the installation and, by undertaking the proposed works, the building's compliance with the Building Regulations (in particular those relating to energy efficiency and electrical safety) is not compromised.

3.1.3 Suitable and sufficient risk assessments shall be conducted before any work on site commences.

3.1.4 A Construction Phase Plan in accordance with the Construction (Design and Management) Regulations 2015 shall be drawn up before work on site commences.

3.1.5 Where responsible for notification under the Building Regulations, the MCS Contractor shall ensure that notification has been completed prior to handing over the installation.

Note: Where notification under the Building Regulations is to be undertaken by others (e.g. the developer of a new-build project) then it is permissible for the MCS Contractor to handover the installation immediately following commissioning.

Self-certification, in lieu of building control approval, is only permitted where installation and commissioning is undertaken by a person or organisation deemed competent and registered with a Competent Persons Scheme (CPS) approved by the relevant government department for the scope of work being undertaken. Further details can be found at http://www.competentperson.co.uk.

3.1.6 The MCS Contractor must ensure the installation is compliant with the Electrical Safety, Quality and Continuity Regulations 2002 and, in accordance with Regulation 22(2)(c), must follow the technical requirements and procedures:

- In Engineering Recommendation (EREC) G98 for installations up to and including 16 A per phase
- In EREC G99 for installations exceeding 16 A per phase
- In EREC G100 where the export of power is to be limited

3.1.7 Notification to the distribution network operator in accordance with the procedures set out in EREC G98 or EREC G99 shall be undertaken by the MCS Contractor.

Note: the 16 A per phase threshold is the total aggregated AC output of all generators. For example, a 3kW micro-CHP system and a 3kW electrical energy (battery) storage system are connected in parallel to the same single-phase AC supply, gives a combined maximum theoretical output greater than 16 A. In this case EREC G99 applies.

3.2 MANUFACTURER'S INSTRUCTIONS

3.2.1 All equipment should be installed in accordance with its manufacturer's instructions.

3.2.2 Where the manufacturer's instructions conflict with the requirements of this Standard then the requirements of this Standard take precedence unless it can be proven that system performance, safety and durability are no worse than if the requirements of this Standard are followed.

3.3 EQUIPMENT CERTIFICATION AND LISTING

3.3.1 The micro-CHP product(s) specified shall be listed on the MCS website (www.mcscertified.com). These listings include heat pumps both MCS certified (according to MCS 014) and by other schemes that MCS considers equivalent.

3.3.2 All installed equipment:

a) Shall be fit for its purpose in the installation
b) Has completed the conformity assessment process and is appropriately marked by a Notified Body in compliance with the relevant legislation

Note: for example this means the CE mark but this could change as the UK leaves the EU.

3.4 SPACE HEATING DESIGN

3.4.1 Where the micro-CHP appliance is added to provide heat in parallel with an existing heating system, and the building heating envelope and heating system are unchanged, then no heat loss calculations are required.

3.4.2 The added appliance and peripherals should be designed and installed to allow for safe de-commissioning so that the pre-existing heating system can be restored to full functionality.

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

3.4.3 Where the micro-CHP appliance replaces a heating appliance, or is designed to heat an extension to the building heating envelope, or where the heating system heat emitters are being replaced (in part of in full), then heat loss calculations are required in order to correctly size the replacement appliance and all emitters. The following procedure shall be followed:

a) A heat loss calculation should be performed in accordance with BS EN 12831.

b) A design internal temperature not less than the floor-space weighted average of the room temperatures given in Table 1 and external temperatures specified in Table 2 column B (by geographical location), shall be used.

c) When calculating the heat loss through a solid floor in contact with the ground, the temperature difference to be used is the internal design room temperature (Table 1) minus the local annual average external air temperature.

d) When calculating the heat loss through a suspended floor, the temperature difference to be used is the internal design room temperature (Table 1) minus the design external air temperature (Table 2).

e) A micro-CHP appliance should be selected that will provide at least 150% of the calculated design space heating power requirement at the selected internal and external temperatures in Tables 1 and 2, after taking into consideration the design flow temperature and heat emitter sizing. This over-capacity is to allow for intermittent heating patterns and allowances for heating hot water (if applicable).

f) MCS certified equipment shall be used that passes the performance standard stated in MCS014.

Room	Internal design temperatures (°C)
Living room	21
Dining room	21
Bedsitting room	21
Bedroom	18
Hall and landing	18
Kitchen	18
Bathroom	22
Toilet	18

Table 1: Internal design temperatures taken from CIBSE Guide which should be consulted for data for other applications. CIBSE Guide A also contains information on how to adapt this data for non-typical levels of clothing and activity.

Location	Altitude (m)	Hourly dry-bulb temperature (°C) equal to or exceeded for % of the hours in a year	
		A (99%)	B (99.6%)
Belfast	68	-1.2	-2.6
Birmingham	96	-3.4	-5.4
Cardiff	67	-1.6	-3.2
Edinburgh	35	-3.4	-5.4
Glasgow	5	-3.9	-5.9
London	25	-1.8	-3.3
Manchester	75	-2.2	-3.6
Plymouth	27	-0.2	-1.6

Table 2: Outside design temperatures for different locations in the UK taken from CIBSE Guide A. which also gives information on how to adapt and use this data

3.4.4 Where other heat sources are available to the same building then:

a) The combined output of all heat sources shall be not less than 100% of the calculated heat loss.

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b) All heat sources intended to supply 100% of the calculated heat loss shall be fully and correctly integrated into a single control system.

Note: the control system should preferably prioritise the source of heat which causes the lowest carbon emissions.

c) It shall be clearly stated in the contract what proportion of the building's space heating and domestic hot water has been designed to be provided by the micro-CHP appliance.

3.4.5 Where heat is to be provided to only a part or an extension of a building heating envelope then the heat demand calculations should cover that area only. Where this is not calculable within BS EN 12831, a calculation for the entire building heat demand can be used and adjusted proportionally for floor space.

3.5 DOMESTIC HOT WATER DESIGN

3.5.1 It is common for micro-CHP appliances to come with dedicated and specially designed hot water and/or thermal storage tanks. Where this is not the case, the following clauses should be used to calculate the hot water tank size and capacity.

3.5.2 Where the micro-CHP appliance is added to provide hot water in parallel with an existing hot water heating system, and the building hot water demand and supply system are unchanged, then no hot water demand calculations for hot water tank sizing are required.

3.5.3 The added appliance and peripherals should be designed and installed to allow for safe de-commissioning so that the pre-existing hot water system can be restored to full functionality.

3.5.4 Where the micro-CHP appliance replaces a hot water appliance, or is designed to provide hot water to an extension to the building envelope then hot water demand calculations are required in order to correctly size a domestic hot water cylinder. The method below should be followed however other calculation methods are acceptable in addition. If the additional method(s) of calculation are notably different in results then the MCS Contractor shall decide which method gives the most suitable result, with the justification explained to the customer.

Note: Where the micro-CHP appliance comes with a manufacturer's specified hot water tank or the appliance provides instantaneous hot water then no sizing of a hot water cylinder is required.

3.5.5 In non-domestic buildings calculate the daily hot water demand using an appropriate method accounting for building usage along with number and type of hot water outlets.

3.5.6 In domestic buildings calculate the daily hot water demand ($V_{d,average}$) using the following formula:

$$V_{d,average} = 45 \times N$$

Where N = the greater of:

a) The number of bedrooms + 1

b) The number of known occupants

3.5.7 The desired domestic hot water cylinder reheat time shall be agreed with the customer.

3.5.8 Using the daily hot water demand, reheat times and proposed micro-CHP heating capacity, an appropriately sized hot water cylinder should be specified.

Note: It is acknowledged that the size of cylinder may be limited by the available space.

3.5.9 The specification of the domestic hot water cylinder shall follow the manufacturer's and/or cylinder manufacturer's recommendations.

3.5.10 Where an existing domestic hot water cylinder is used then:

a) The thermal insulation of the hot water cylinder, and all pipes connected to it, shall be upgraded to a level at least equivalent to that applicable to new installations under relevant legislation and guidance. For cylinders with factory applied insulation, this condition can be satisfied if the cylinder standing heat loss is certified to comply with Section 12 of BS 1566-1:2002 or equivalent. Where this certification is not apparent, or where the cylinder does not have factory-applied insulation, the contractor shall install additional insulation certified to comply with BS 5615:1985.

b) Proper duty of care shall be exercised to ensure that the hot water cylinder is fit for purpose as regards its mechanical integrity. Consideration shall be given to scale build-up affecting overall system efficiency, damage, and deterioration caused by corrosion. Such issues shall be considered in the context of any additional stress placed upon the cylinder through the connection of the micro-CHP (e.g. thermal stress or additional system pressure).

c) The size of the cylinder shall comply with the micro-CHP manufacturer's requirements.

3.5.11 Where hot water is to be provided to only a part or an extension of a building then the hot water demand calculations should cover occupancy in that area only.

3.5.12 Domestic hot water systems shall incorporate a means to prevent bacterial growth (including *legionella bacteria*).

Note: where prevention is through periodic pasteurisation of the system then a bacterial risk assessment can help determine how frequent this pasteurisation should occur.

3.6 METERING & COMMUNICATION

Metering

3.6.1 A means of recording and displaying the total AC electrical energy output (KWh) and the instantaneous AC generation output of the appliance shall be available.

3.6.2 If required for billing and / or payment purposes, the means of recording AC generation of the system shall be a meter approved under the European Measuring Instruments Directive (MID) or equivalent British standard showing the serial number on the front panel where it could be photographed alongside the make, model and meter reading.

Note: Installation of a MID approved meter would also satisfy clause 3.6.1.

3.6.3 The means of recording AC generation, be it a dedicated meter or otherwise, should be readily accessible and readable by the customer without requiring the use of a tool, ladder or torch.

Note: Use of computers or the internet is an acceptable method of monitoring AC generation.

Data Communication & Security

3.6.4 The data privacy and security of the site's home area network shall be maintained. Where the installation comprises of any internet connected devices:

- The device's network access credentials (username & passwords) shall be updated in consultation with the customer
- Relevant components in the micro-CHP system should comply with the technical specification ETSI Technical Specification 103 645 Cyber Security for Consumer Internet of Things.

3.6.5 Installations requiring local area network, home area network, and/or internet access in commercial and industrial premises shall comply with the client organisation's information technology and information security policies and procedures.

3.7 SAFETY AND DURABILITY

3.7.1 All work must be compliant with Gas-Safe regulations.

3.7.2 All work on flues must follow Part J of the Building Regulations.

3.7.3 The contractor shall identify if, in the event of a power cut, the supply of gas to the appliance will be stopped (e.g. there is an automatic gas shut off valve installed). The customer shall be informed of the potential outcomes of a power-cut.

3.7.4 The contractor shall place on or around any gas-meter or shut-off valves that might restrict gas flow to the appliance a note or warning notifying others that the appliance owner must be notified before shutting-off the gas line.

Note: Some micro-CHP appliances can be damaged or become temporarily inoperable by the loss of a gas connection.

3.7.5 The contractor shall create a dedicated electrical connection from the appliance to the building electrical consumer unit. RCD protection is not necessary unless otherwise stipulated in regulations.

4 COMMISSIONING

4.1 COMMISSIONING

4.1.1 The micro-CHP 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: Suitable commissioning checklists can include those provided by the micro-CHP manufacturer and the example given in Appendix B.

5 PUBLICATIONS, REFERENCE AND FURTHER READING

The below lists are provided so that contractors know which documents have been used as a basis for the development of the requirements of this MIS Standard and they are able to further research topics if they need to do so.

- All documentation required for compliance with Gas-Safe
- BS 7671:2018 Requirements for Electrical Installations (the latest edition of the IET Wiring Regulations)
- Engineering Recommendation G98 "Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 27 April 2019"
- Engineering Recommendation G99 "Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019"
- Engineering Recommendation G100 "Technical Requirements for Customer Export Limiting Schemes"
- BS EN12831-1:2017 Energy performance of buildings. Method for calculation of the design heat load. Space heating load, Module M3-3.
- BS EN1749:2020 - Classification of gas appliances according to the method of supplying combustion air and of evacuation of the combustion products (types).
- BS EN40565:2015+A1:2019 - Gas appliances. Combined heat and power appliance of nominal heat input inferior or equal to 70 kW.
- BS EN 13203-4: 2016 Gas-fired domestic appliances producing hot water. Assessment of energy consumption of gas combined heat and power appliances (micro-CHP) producing hot water and electricity.
- Guide A: Environmental Design. (CIBSE publication).

APPENDIX A – EXAMPLE COMMISSIONING CHECKLIST

Note: Please refer to any manufacturers commissioning checklist and record information requirements as this may affect the equipment warranty.

Customer Details		Company Details	
Customer Name:		Job Reference:	
Address:		Date:	
		Technician:	
		MCS No:	
		Gas Safe No:	
Post Code:		Contact No:	
Email:		Email:	

Product Information			
Manufacturer:			
Micro-CHP type:		Fuel Type:	
Model No:		Serial No:	
Electrical Output (kW):		Heat Output (kW):	
Installed as per manufacturer's instructions:			

System Details	Micro-CHP	Cylinder (if installed)	Boiler (if applicable)
System Working Pressure (bar)			
Expansion vessel precharge (bar)			
Distilled water fill?			
Water fill hardness (°dH)			
Inhibitors?			
Safety Valve rating (bar)			
Safety Valve pipe Size DN/ Discharge pipe DN			

Installation Details					
All installation works complete	[ ]	All electrical wiring complete	[ ]	Electrical supply tested	[ ]
Ventilation is installed & correct	[ ]	Any safety controls fitted and tested	[ ]	Local electrical isolation provided	[ ]
Fuel supply purged and tested	[ ]	Gas Filter installed (for black dust)	[ ]	All pipework installation complete	[ ]
Is flue complete	[ ]	3rd party flue certificate available	[ ]	Equivalent length of flue (m)	[ ]
System filled and vented	[ ]	Heating Controls set-up per design	[ ]	Labelling on electrical isolation to indicate generation device	[ ]
Sufficient heat load available	[ ]	Radiators balanced	[ ]	Demonstrated and explained to owner/user	[ ]

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Gas Line Checks

	Micro-CHP	Boiler (if applicable)
Appliance tightness test	[ ]	[ ]
Flue operation correct	[ ]	[ ]
Correct Ventilation	[ ]	[ ]
Safe & Operational	[ ]	[ ]

Flue Checks

Reading	Low	Average	High
O2 (%)			
CO (ppm)			
CO2 (%)			
Ratio CO/CO2			
NOx (mg/kWh)			
Eff.NCV (%)			
Flue Draught (hPa)			
Flue gas temp (°C)			
Ambient temp (°C)			
Excess Air (%)			

Technicians comments

Technicians Signature:		Date:	
Customers Signature:		Date:	