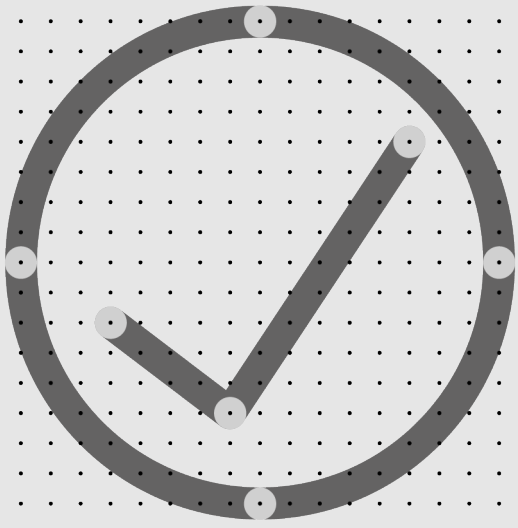
STANDARDS DOCUMENT

MCS 007 ISSUE 7.0

The Heat Pump Standard

(Product)



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ABOUT MCS

Giving you 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.

We're here to ensure it's a positive one.

Working with industry we define, maintain, and improve quality – certifying products and installers so people can have confidence in the low-carbon technology they invest in. From solar and wind, to heat pumps, biomass, and battery storage, we want to inspire a new generation of home-grown energy, fit for the needs of every UK home and community.

About

The Microgeneration Certification Scheme Service Company Ltd (MCSSCo Ltd) trades as MCS and is wholly owned by the non-profit MCS Charitable Foundation. Since 2007, MCS has become the recognised Standard for UK products and their installation in the small-scale renewables sector.

We create and maintain standards that allow for the certification of products, installers, and their installations. Associated with these standards is the certification scheme, run on behalf of MCS by Certification Bodies who hold UKAS accreditation to ISO 17065.

MCS certifies low-carbon products and installations used to produce electricity and heat from renewable sources. It is a mark of quality. Membership of MCS demonstrates adherence to these recognised industry standards; highlighting quality, competency, and compliance.

Vision

To see MCS certified products and installations in every UK home and community.

Mission

To give people confidence in low-carbon energy technology by defining, maintaining and improving quality.

Values

1. We are expert – ensuring quality through robust technical knowledge
2. We are inspiring – helping to reshape energy in UK homes and communities
3. We are collaborative – working with industry and government to create positive change
4. We are principled – operating in a way that's clear, open, and fair
5. We are determined – supporting the UK's drive towards a clean energy future

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.

Note that only the latest issue of the standard will show amendment numbers in the table below. All legacy amendment numbers from previous issues are removed for simplicity.

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

Amendments issued since publication

Document no.	Amendment details	Date
2.0	Assessment and performance criteria for exhaust air and swimming pool heat pumps added Version of EN 14511:2013 updated to 2007 (from 2004)	15/12/2009
3.0	Criteria for VHTHPs, HWHPs and SAHPs added.	21/11/2014
4.0	Updated to be in line with ErP requirements.	01/05/2015
5.0	Clarification on testing requirements added.	24/09/2015

6.0	Clarification on testing requirements including product families. Updates to definitions. Updates to current versions of standards and regulations.	26/11/2018
7.0	Significant update to improve clarity, new format, and other changes.	24/04/2025

FOREWORD

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).

This issue 7.0 is a significant update to issue 6.0. It is available for reference from the date of publication 24/04/2025. Manufacturers or importers of microgeneration systems who have certificated products in accordance with MCS 007 may commence working in accordance with this update from the date of publication. Compliance with this update is mandatory for products to be certified in accordance with MCS 007 from the date of implementation 24/04/2027.

1 INTRODUCTION & SCOPE

This Standard describes the evaluation and assessment practices for the purposes of certification and listing of Heat Pump products. The certification and listing of products is based on evidence acceptable to the Certification Body:

- that the product meets the appropriate standards detailed herein and;
- that the manufacturer has staff, processes, and systems in place to ensure that the product delivered meets the standard.

And on:

- periodic audits of the manufacturer, including testing as appropriate;
- compliance with the contract with the Certification Body for listing and approval including agreement to rectify faults as appropriate.

Whilst it is not possible to ensure safety, this Standard includes criteria which should help to mitigate potential safety risks from the installation and operation of the product.

Certification against this Standard does not imply compliance with regulations which may apply to such products unless explicitly stated.

The scope of this Product Standard is limited to individual heat pumps producing up to 45kWth output when operating at full load under the relevant standard rating conditions specified in EN14511-2:2022.

This includes the following types of heat pump products:

- Air-to-water (including solar assisted and exhaust)
- Ground/brine-to-water
- Water-to-water
- Gas absorption & adsorption
- Air-to-air (including exhaust)
- Hybrid heat pump units
  Note:
  Only the heat pump component within the unit is assessed for MCS certification. The supplementary heat source that makes up the rest of the unit is out of scope of this standard.

This excludes specifically:

- Heat pumps specifically designed solely for the extraction of heat from loft spaces.

It is the responsibility of the manufacturers and suppliers of equipment to ensure their products and any information provided conforms to all relevant legislation. They should also ensure adequate installation, maintenance, and Health & Safety information is available to potential installers and other relevant operatives within the supply chain.

2 DEFINITIONS & GLOSSARY

For the purposes of this Standard the following definitions apply. Unless otherwise stated, the term 'heat pump' used throughout this Standard refers to includes low, medium, and high temperature heat pumps.

Term	Definition
Low-temperature application	An application where the heat pump space heater delivers its declared capacity for heating at an indoor heat exchanger outlet temperature of 35°C, at standard conditions.
Intermediate temperature application	An application where the heat pump space heater delivers its declared capacity for heating at an indoor heat exchanger outlet temperature of 45°C, at standard conditions.
Medium temperature application	An application where the heat pump space heater or heat pump combination heater delivers its declared capacity for heating at an indoor heat exchanger outlet temperature of 55°C.
High temperature application	An application where the heat pump space heater or heat pump combination heater delivers its declared capacity for heating at an indoor heat exchanger outlet temperature of 65°C.
Low temperature heat pump	A heat pump space heater that is specifically designed for low-temperature application, and that cannot deliver heating water with an outlet temperature of 52°C at an inlet dry (wet) bulb temperature of – 7°C (– 8°C) in the reference design conditions for average climate (88% part load condition for water/brine-to-water units).
Medium temperature heat pump	A heat pump space heater that has been demonstrated to be able to deliver heating water with an outlet temperature of 52°C or more at an inlet dry (wet) bulb temperature of – 7°C (– 8°C) in the reference design conditions for average climate (88% part load condition for water/brine-to-water units).
High temperature heat pump	A heat pump space heater that has been demonstrated to be able to deliver heating water with an outlet temperature of 65°C at an inlet dry (wet) bulb temperature of – 7°C (– 8°C) in the reference design conditions for average climate (88% part load condition for water/brine-to-water units).

Heat Pump Space heater	A space heater using ambient heat from an air source, water source or ground source, and/or waste heat for heat generation; a heat pump space heater may be equipped with one or more supplementary heaters using the Joule effect in electric resistance heating elements or the combustion of fossil and/or biomass fuels.
Domestic hot water (DHW) heat pump	Domestic hot water (DHW) heat pump means a heat pump using ambient heat from an air source, water source or ground source, and/or waste heat for heat generation that is solely designed to provide heat to deliver hot drinking or sanitary water at given temperature levels, quantities, and flow rates during given intervals, and is connected to an external supply of drinking or sanitary water.
Heat Pump Combination heater	A heat pump space heater that is designed to also provide heat to deliver hot drinking or sanitary water at given temperature levels, quantities, and flow rates during given intervals, and is connected to an external supply of drinking or sanitary water.
Gas absorption/ adsorption heat pump	A heat pump that uses direct heat energy from the combustion of gas (natural or LPG) to affect the absorption or adsorption of a medium into another which creates a low temperature low pressure side and a high-pressure high temperature side. The process may be to reversibly change the chemical composition (Absorption) or merely mechanically combine two chemicals temporarily together (Adsorption).
Hybrid heat pump unit	Encased assembly designed as a complete unit consisting of the combination of a heat pump and a supplementary heat source, managed by a common controller providing an optimised operation of the unit.
Bivalent Temperature (T_{biv})	The lowest outdoor temperature point at which the heat pump is declared to have a capacity able to meet 100% of the heating load without the use of a supplementary heater, integrated or otherwise.
Solar assisted heat pump	A type of air source heat pump (space or combination heater) that uses a non-aspirated evaporator located externally in the ambient air that can benefit from direct solar radiation for additional refrigerant heat input. These evaporators are sometimes referred to as "thermodynamic" panels.
Standard rating conditions	The operating conditions of heaters under average climate conditions for establishing the rated heat output, seasonal space heating energy efficiency, water heating energy efficiency, sound power level and nitrogen oxide emissions. These conditions are listed in Table 3 of

	COMMISSION REGULATION (EU) No 813/2013 for heat pump space heaters and heat pump combination heaters.
Coefficient of Performance (COP) – electrically driven Primary Energy Ratio (PER) – fuel driven	The declared heating capacity of a heat pump divided by the effective energy input of the heat pump at a specific temperature condition at any given point in time and is expressed as a ratio (kWh/kWh).
Seasonal Coefficient of Performance (SCOP) – electrically driven Seasonal Primary Energy Ratio (SPER) – fuel driven	SCOP/SPER is the average coefficient of performance of a heat pump unit representative of the whole designated heating season in either cold (Helsinki), average (Strasbourg), or warm (Athens) climate zones. It is calculated as the reference annual heating demand divided by the annual energy consumption for heating and as such is expressed as a ratio (kWh/kWh). .
Seasonal Space Heating Energy Efficiency (SSHEE)	SSHEE is the ratio, expressed as a percentage, between the space heating demand for a designated heating season supplied by a space heater, and the annual energy consumption required to meet this demand. The following formula describes the relationship between SPER and SSHEE: $SSHEE = SPER - \text{the sum of corrections for SSHEE} = SPER - \sum F1+F2$ The following formula describes the relationship between SCOP and SSHEE: $SSHEE = \frac{SCOP}{CC} - \text{the sum of corrections for SSHEE} = \frac{SCOP}{2.5} - \sum F1+F2$ F1 is equal to 3% and F2 is equal to 0%, except for water (brine)-to-water heat pumps, where F2 is 5%. F1 accounts for the adjusted contributions of temperature controls and F2 accounts for the energy consumption of brine and water pumps.

Supplementary Heat Source	A Supplementary Heat Source is a heat source which functions to support the heat pump. The supplementary heat source will be one which generates its heat differently from a heat pump, and is commonly a fossil fuel boiler.
Conversion Coefficient (CC)	The coefficient reflecting the estimated 40% average EU generation efficiency referred to in Commission Regulation (EU) No 813/2013; the current value of the conversion coefficient is CC = 2.5
Weather compensation capability	A device, or feature within a device, which maintains the temperature inside the building by sensing and limiting the temperature of the water circulating through the heat generator and heat emitters in relation to the temperatures measured outside the building. For the avoidance of doubt, this means that restricting the maximum temperature of return (heat pump inlet) water, but not the maximum temperature of flow (heat pump outlet) water, will not satisfy this definition.
P-rated Capacity	This is the capacity provided by the refrigerant cycle of the unit without supplementary heaters, even if those are integrated in the unit, except for hybrid heat pumps tested according to the combined method.
Sound Power Level	A measure of the acoustic energy emitted from a source of noise expressed in decibels. It is not affected by the environment or the location of the listener.

3 APPLICATIONS TO JOIN THE SCHEME

Applications should be made to an Accredited Certification Body operating this Scheme, who will provide the appropriate application form and details of the applicable fees.

4 CERTIFICATION AND APPROVAL

4.1 Certification and approval is based on the following:

a) An assessment of the evidence demonstrating compliance with the requirements set out in Section 6.

Evidence of compliance is generally accepted as independent third party testing by a UKAS (or equivalent) accredited test laboratory. However, other evidence of compliance may be considered at the discretion of the Certification Body (see document MCS 011 Testing Acceptance Criteria).

b) An assessment of the evidence demonstrating compliance with the requirements set out MCS 010 – Generic Factory Production Control and Product Quality Requirements.

c) Review of the technical documentation relating to the material or product.

4.2 Applications for a range of common products (product families) are accepted in this Product Standard. Acceptance is based only on the definitions and testing regimes as set out by either the CEN Heat Pump Keymark Scheme or the Eurovent Certita Certification Scheme, current at the time of assessment. Certification Bodies shall satisfy themselves that the product manufacturer has adequately demonstrated and validated the 'Product family' approach, supplying where required, adequate information on predicted data and subsequent test results.

Note: For example, they may find where one or more characteristics are the same for products with similar design, construction, and functionality that the results of tests for these characteristics on one product may be applied to other similar products.

4.3 A certificate is awarded following demonstration of satisfactory compliance with this Standard, considering any limitations imposed, other appropriate guidelines and satisfactory verification/assessment of the manufacturer's Factory Production Control and technical documentation.

4.4 Certificates shall contain the name and address of the manufacturer, model and reference number of the Heat Pump, a unique certificate reference number, the issue number, date of certification, and any limitations of certification.

Note: An example of a limitation might include where a solar assisted heat pump product is tested with a 200 litre DHW tank to qualify under the Product Standard. Therefore, the certificate shall indicate that it shall only be installed with or retrofitted to DHW tanks of 200 litres or below for the product to be installed compliantly.

4.5 Certificates shall include the information as defined in Appendix B.

4.6 Certificates are valid from the date of issue and are maintained and held in force subject to satisfactory completion of the requirements for maintenance of certification (see Clause 7) but remain the property of the issuing Certification Body.

4.7 All data shall be published at the point the product is listed or, for products already certified, from their manufacturers' next annual surveillance visit.

4.8 Details of the manufacturer and the certificated product(s) are listed at www.mcscertified.com

5 TECHNICAL DOCUMENTATION

5.1 Technical documentation shall be presented in English for review, and shall assure that the products submitted for test are equivalent to those that are to be manufactured for normal production. It must consist of the following as a minimum:

a) Details of intended use, application, and classifications (if any) required.
b) Manufacturing drawings and/or specifications including tolerances, issue, and revision numbers.
c) The revision number of the product.
d) Raw material and components specifications.
e) Refrigerant type
f) Details of the quality plan applied during manufacture to ensure ongoing compliance.
g) Test / Examination reports in accordance with the relevant standards defined in this standard. Where historical test data is requested to be considered for the application, full test report and details of any existing approvals.
h) Declared performance data.

Note: This information is declared from the manufacturer and therefore not verified through the Certification Body. It is the responsibility of the manufacturer to ensure the information is correct.

i) Proof of weather compensation capability, for space heating applications only, evidenced with a weather compensation curve for external ambient temperatures between -5°C and +15°C at a target room temperature of 21°C. The Y-axis should display the change in heat pump flow temperature and the X-axis the change in external ambient temperature.

Note: This capability must be demonstrated within the onboard heat pump control unit itself and not as an optional additional functionality that is sold separately.

j) User and installation documentation including commissioning requirements, operation and maintenance instructions, and evidence that the installed system can meet the installation requirements of the Building Regulations of the country where the product will be sold.

6 PERFORMANCE AND TESTING CRITERIA

This section sets out the performance requirements, testing methods and other specific requirements for each type of heat pump product recognised by the Scheme.

For all product types, physical testing is required at the conditions indicated either in this document or as defined in the relevant standards identified. All testing of products must be in accordance with the requirements of MCS 011.

Note: Where test conditions are taken from EN 14825:2022 the standard requires the product also to be tested at the relevant full load standard rating condition. This is necessary to determine the value of the fluid flow rate(s) to be used during the part load condition tests.

Note:

- *Low Temperature Heat Pumps shall supply test data to 35°C*
- *Medium Temperature Heat Pumps shall supply test data at 35°C and 55°C*
- *High Temperature Heat Pumps shall supply test data at 35°C, 55°C and 65°C*

Note: each application will be dealt with on a case-by-case basis and further information about the acceptance of previous testing is available on request.

6.1 ELECTRICALLY DRIVEN AIR, SOLAR-ASSISTED AIR, EXHAUST AIR, GROUND, AND WATER SOURCE HEAT PUMPS FOR SPACE HEATING

6.1.1 For compliance with this Scheme, electrically driven heat pumps for space heating shall be optimised for heating.

6.1.2 Space heaters shall:

- Meet or exceed the minimum SSHEE and SCOP performance benchmarks in Table 1 of MCS 007, as calculated by the MCS SCOP Calculator for Air to Water and Ground / Brine to Water heat pumps (or MCS 026).

- Not exceed the sound power level limits specified within COMMISSION REGULATION (EU) No 813/2013, Appendix II, Clause 3, "Requirements for sound power level", when tested at the relevant standard rating condition.

6.1.3 Combination heaters shall:

- Meet or exceed the minimum SSHEE and SCOP performance benchmarks in Table 1, as calculated by the MCS SCOP Calculator for Air to Water and Ground / Brine to Water heat pumps (or MCS 026).

- Meet the requirements of COMMISSION REGULATION (EU) No 813/2013, Appendix II, Clause 2, "Requirements for water heating energy efficiency".

- Not exceed the sound power level limits within COMMISSION REGULATION (EU) No 813/2013, Appendix II, Clause 3, "Requirements for sound power level", when tested at the relevant standard rating conditions for the temperature application of the heat pump. For example, the standard rating conditions for a medium temperature application heat pump would be A7/W55. Refer to EN 14511-2 for more information.

- Meet the safety requirements of those in Table 2 only.

Product Category	Minimum (SSHEE) & [SCOP]
Heat pump space heaters and heat pump combination heaters, except for low temperature heat pumps	(110%) [2.8]
Low temperature Heat Pumps	(125%) [3.2]

Table 1

6.1.4 Evidence shall be provided of actual testing of products at the relevant test point conditions and testing methodology selected from those defined in Table 2.

Test Category	Test Conditions	Heat Pump Type(s)
Thermal Performance	EN 14825:2022 Table 8 – Average Condition A or B for low temperature application (35°C) EN 14825:2022 Table 9 – Average Condition A or B for intermediate temperature application (45°C) EN 14825:2022 Table 10 – Average Condition A or B for medium temperature application (55°C) EN 14825:2022 Table 11 – Average Condition A or B for high temperature application (65°C)	Air to water
	EN 14825:2022 Table 8 – Average Condition A or B for low temperature application (35°C) EN 14825:2022 Table 9 – Average Condition A or B for intermediate temperature application (45°C) EN 14825:2022 Table 10 – Average Condition A or B for medium temperature application (55°C) EN 14825:2022 Table 11 – Average Condition A or B for high temperature application (65°C)	Exhaust air to water[1]
	EN 14825:2022 Table 12 – Average Condition A or B for low temperature application (35°C) EN 14825:2022 Table 13 – Average Condition A or B for intermediate temperature application (45°C)	Water/brine to water

[1] *The performance of exhaust air heat pumps should be tested at the minimum air flow rate specified by the manufacturer. This flow rate shall be clearly defined and visible in the product documentation.*

	EN 14825:2022 Table 14 – Average Condition A or B for medium temperature application (55°C) EN 14825:2022 Table 15 – Average Condition A or B for high temperature application (65°C)	
	EN 14825:2022 Table 6 – Average Condition A or B	Air to air
Sound Power Levels	EN 14511-2:2022 at Standard Rating Conditions as per the definition in Section 2 Definitions and Glossary of this standard EN 12102-1:2022	All
Operation	EN 14511-4:2022	All

Table 2

Note: test standards for solar assisted air-to-water heat pumps are under development.

6.2 ELECTRICALLY DRIVEN AIR/WATER HEAT PUMPS DESIGNED FOR USE WITH OUTDOOR SWIMMING POOLS

6.2.1 The heat pump will operate with water flowing from swimming pool filtration systems and so will require a heat exchanger designed and constructed to resist erosion and chemical corrosion from swimming pool water. This heat exchanger may be fitted directly to the heat pump or may be fitted as an additional heat exchanger after a heat exchanger that is not suitable for use with swimming pool water.

6.2.2 The test methodology is that described in EN14511-3:2022. Measurement of the outlet water temperature should be performed as follows:

a) For heat pumps fitted with a heat exchanger suitable for use with swimming pool water, the heat exchanger water outlet temperature should be measured directly.

For heat pumps that require an additional heat exchanger after the heat pump heat exchanger, the outlet water temperature to the swimming pool should be measured at the outlet of the additional heat exchanger.

6.2.3 The test conditions for air source heat pumps used to heat swimming pools are as defined below in Table 3.

Outdoor heat exchanger air inlet dry bulb temperature	15°C
Outdoor heat exchanger air inlet wet bulb temperature	12°C
Swimming pool heat exchanger inlet water temperature	23°C
Swimming pool heat exchanger outlet water temperature	26°C

Table 3

6.2.4 When tested under the above conditions air source heat pumps used for heating swimming pools must achieve a minimum COP of 3.6.

6.3 GAS ABSORPTION AND ADSORPTION HEAT PUMPS

6.3.1 For compliance with this Scheme, gas absorption and adsorption heat pumps for space heating shall be optimized for heating.

6.3.2 Space heaters shall:

- Meet or exceed the minimum SPER performance benchmarks in Table 4 of MCS 007, as calculated by the MCS SPER Calculator for Air to Water and Ground / Brine to Water heat pumps (MCS 027).

- Not exceed the sound power level limits within COMMISSION REGULATION (EU) No 813/2013, Appendix II, Clause 3, "Requirements for sound power level", when tested at the relevant standard rating condition.

6.3.3 Combination heaters shall meet the requirements of the following:

- Meet or exceed the minimum SPER performance benchmarks in Table 4 of MCS 007, as calculated by the MCS SPER Calculator for Air to Water and Ground / Brine to Water gas absorption and adsorption heat pumps (MCS 027).

- Meet the requirements of COMMISSION REGULATION (EU) No 813/2013, Appendix II, Clause 2, "Requirements for water heating energy efficiency".

- Not exceed the sound power level limits within COMMISSION REGULATION (EU) No 813/2013, Appendix II, Clause 3, "Requirements for sound power level", when tested at the relevant standard rating condition.

Product Category	Minimum SPER
Gas absorption and adsorption heat pump space heaters and heat pump combination heaters, except for low temperature heat pumps	110% [2.8]
Gas absorption and adsorption low temperature heat pumps	125% [3.2]

Table 4

6.3.4 Evidence shall be provided of actual testing of products at the relevant test point conditions and testing methodology selected from those defined in Table 5:

Test Category	Test Conditions	Heat Pump Type(s)
Thermal Performance	EN 12309-6:2014 Table 5 - Condition A for a low temperature application (35°C) EN 12309-6:2014 Table 8 - Condition A for an intermediate temperature application (45°C) EN 12309-6:2014 Table 11 - Condition A for a medium temperature application (55°C) EN 12309-6:2014 Table 14 - Condition A for a high temperature application (65°C)	Air to water
	EN 12309-6:2014 Table 17 - Condition A for a low temperature application (35°C) EN 12309-6:2014 Table 20 - Condition A for an intermediate temperature application (45°C) EN 12309-6:2014 Table 23 - Condition A for a medium temperature application (55°C)	Water/brine to water

	EN 12309-6:2014 Table 26 - Condition A for a high temperature application (65°C)	
Sound Power Levels	EN 12309-3:2014 EN 12102-1:2022	All
Operation	EN 12309-2:2015	All

Table 5

6.4 ELECTRICALLY DRIVEN HEAT PUMPS DESIGNED FOR DOMESTIC HOT WATER PRODUCTION ONLY

6.4.1 For compliance with this Scheme electrically driven heat pumps designed for domestic hot water production shall meet the requirements of the following:

- COMMISION REGULATION (EU) No 812/2013 Appendix II Energy Class A or above
- COMMISION REGULATION (EU) No 814/2013 Appendix II

6.4.2 EN 16147 specifies a method for testing heat pumps designed for domestic hot water production with either integral or stand-alone water storage tanks. The heat pump and storage tank are considered to be a package and are tested and reported together.

6.4.3 The manufacturer's instructions shall:

- State clearly the size of the storage tank with which the heat pump was tested.
- Require that the heat pump shall not be installed with a tank of a greater capacity than which it was tested.

6.4.4 Evidence shall be provided of actual testing of products at the relevant test point conditions and testing methodology selected from those defined in Table 6:

Test Category	Test Conditions	Heat Pump Type(s)
Thermal performance	EN 16147:2017+A1:2022	Heat pump for domestic hot water production only.

Sound power levels	EN 12102-2:2019	
Operation	EN 16147:2017	

Table 6

6.5 HYBRID HEAT PUMP UNITS

6.5.1 For compliance with this standard, where the heat pump component of the unit is providing:

- Combination or space heating only:
    - For electrically driven hybrid heat pump units, the methodology requirements set out in Section 8 of BS EN 14825:2022 and testing conditions set out in Table 2 of this standard shall be complied with.

6.5.2 The legal and performance requirements for the supplementary heat source, in a hybrid heat pump unit, falls outside the scope of this standard.

6.5.3 The control philosophy shall be capable of prioritising heat pump utilisation.

6.5.4 All heat sources shall be fully and operationally integrated into a single master control system, and can operate either simultaneously or independently depending on operating conditions and the selected control's philosophy.

6.5.5 Instructions on how these controls can be implemented and adjusted by the user should be within the user documentation.

6.6 ELECTRICALLY DRIVEN SOLAR ASSISTED HEAT PUMPS

6.6.1 For compliance with this standard, solar assisted heat pumps that provide both space heating and domestic hot water, as well as solar assisted heat pumps providing domestic hot water only, must meet the requirements as set out in Clauses 6.1 and 6.4 respectively. This is in addition to the requirements outlined below.

Note: Test requirements for solar assisted heat pump are under development.

6.6.2 Requirements for the external absorbers incorporated in solar assisted heat pumps are defined in Appendix A – Product testing and performance criteria for external absorbers incorporated in solar assisted heat pumps.

6.6.3 The manufacturer's instructions shall state clearly the number and specification of solar collector(s) to be used in association with the product.

6.6.4 Solar assisted heat pumps shall incorporate and demonstrate a means of preventing ice build-up on the external absorber. They shall be tested under conditions where in the absence of such means, ice build-up would occur.

6.7 AIR-TO-AIR HEAT PUMPS WITH ELECTRICALLY DRIVEN COMPRESSORS DESIGNED FOR SPACE HEATING

6.7.1 For compliance with this standard, air-to-air heat pumps designed for space heating with a heating capacity ≤12kW must meet the requirements as set out in Clauses 6.1.

6.7.2 Air-to-air heat pumps with a heating capacity >12kW and ≤45kW shall meet the requirements of the following:

- Not exceed the sound power level limits within COMMISSION REGULATION (EU) No 813/2013, Appendix II, Clause 3, "Requirements for sound power level", when tested at the relevant standard rating condition.
- COMMISSION REGULATION (EU) No 2016/2281, Annexe II, Table 2, "Second tier minimum seasonal space heating energy efficiency of air heating products".

6.7.3 Evidence shall be provided of actual testing of products at the relevant test point conditions and testing methodology selected from those defined in Table 7:

Test Category	Test Conditions	Heat Pump Type(s)
Thermal performance	COMMISSION REGULATION (EU) No 2016/2281, Annexe III, Table 16, "Standard rating conditions for air-to-air heat pumps and air conditioners"	Air-to-air heat pump for space heating with a heating capacity >12kW and ≤45kW
Sound power levels	EN 14511-4:2022 EN 12102-1:2017	
Operation	EN 60335-2-40:2013	

Table 7

7 MAINTENANCE OF CERTIFICATION AND LISTING

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

7.1 **FACTORY AUDITS**

Certification is maintained through on-going FPC quality system audits in accordance with MCS 010 as appropriate, during which time a detailed check will be made that the product being manufactured is the same as the specification tested.

7.2 **PRODUCT AUDITS**

Product audits will be conducted as follows:

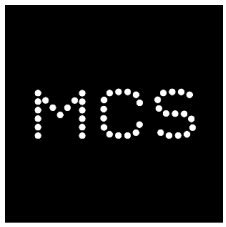
- Review of the product technical data files including materials.
- Review of end of line tests in accordance with the manufacturer's quality plan.
- Repeat testing of elements from the product standard as appropriate to confirm that the product continues to meet the requirements for certification and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

8 CERTIFICATION MARK AND LABELLING

All approved products listed under this Scheme shall be traceable to identify that they have been tested and certificated in accordance with the requirements of this Standard (e.g., via a unique serial number).

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

The Certification Mark(s) to be used for certified products under the scheme is as follows:



Certificate Number MCS "XXX"
"Description of the Technology certificated"

Where 'XXX' is the certificate number, and the logo of the Certification Body issuing the certification would sit on the right-hand side of the logo.

Companies may only use the Mark while certification is maintained.

APPENDIX A - PRODUCT TESTING AND PERFORMANCE CRITERIA FOR EXTERNAL ABSORBERS INCORPORATED IN SOLAR ASSISTED HEAT PUMPS

A1. SCOPE

This appendix specifies tests to be performed on solar assisted heat pump systems for durability (including mechanical strength), reliability and safety of the external absorbers they incorporate. These requirements are in addition to the requirements of EN 14825 and EN 16147. This appendix also includes provision for the evaluation of conformity to these additional requirements.

An ISO EN 9806:2013 test report would meet the requirements of the tests 6, 7, 8, 9, 10 and 11. For the avoidance of doubt, the thermal performance requirements of ISO EN 9806:2017 are not included within the requirements of this Appendix.

A2. NORMATIVE REFERENCES

The following documents, in whole or in part, are normatively referenced in this Appendix and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- EN ISO 9488:2022, Solar energy - Vocabulary
- EN ISO 9806:2017, Solar energy - Solar Thermal collectors - Test methods
- EN 12975:2022, General requirements - Solar collectors
- EN 16147: 2017, Heat pumps with electrically driven compressors – Testing, performance rating and requirements for marking of domestic hot water units

A3. TERMS AND DEFINITIONS

For the purposes of this document, the symbols and units given in EN ISO 9488:2022 apply.

External absorber - A panel which performs the function of an evaporator in a thermodynamic solar assisted heat pump system. This device is remote from the compressor and is usually mounted externally.

A4. SYMBOLS AND UNITS

For the purposes of this document, the symbols and units given in EN ISO 9488:2022 apply.

A5. TEST OVERVIEW

The following table summarises the tests that must be undertaken on the solar panel elements of solar assisted heat pumps for hot water production.

Sub-clause (in this Appendix)	Test
6	Internal pressure test for fluid channels
7	High-temperature resistance
8	External thermal shock test[2]
9	Internal thermal shock test[5]
10	Mechanical load test
11	Final inspection[3]

Table A1

[2] The external and internal thermal shock tests may be combined with the high-temperature resistance test.

[3] Every external absorber tested needs to undergo the final inspection.

OBJECTIVE

The fluid channels shall be pressure-tested to assess the extent to which they can withstand the pressures which they might meet in service.

APPARATUS AND PROCEDURE

The apparatus consists of a hydraulic pressure source (electrical pump or hand pump), a safety valve, an air-bleed valve, and a pressure gauge with a standard uncertainty better than 5%. The air-bleed valve shall be used to empty the fluid channels of air before pressurisation. The fluid channels shall be filled with nitrogen and pressurised to the test pressure for the test period. This pressure shall be maintained while the fluid channels are inspected for swelling, distortion, or ruptures.

TEST CONDITIONS

Fluid channels shall be pressure-tested at ambient temperature within the range 5°C to 40°C, shielded from light. The test pressure shall be 1.5 times the maximum external absorber operating pressure specified by the manufacturer. The test pressure shall be maintained (±5 %) for 15 min.

RESULTS

The external absorber shall be inspected for leakage, swelling and distortion. Leakage can be assumed if pressure loss $\Delta P > 5$ % of the test pressure or 17 kPa, whichever is greater. The results of this inspection shall be reported together with the values of pressure and temperature used and the duration of the test.

A6. HIGH-TEMPERATURE RESISTANCE TEST

OBJECTIVE

This test is intended to assess rapidly whether an external absorber can withstand high temperature and irradiance levels without failures such as significant deposits on the external absorber cover from outgassing of external absorber material or any other effect that possibly could lead to reduced performance, lifetime, safety, or distorted visual appearance of the external absorber.

APPARATUS AND PROCEDURE

The external absorber shall be tested outdoors, or in a solar irradiance simulator. The characteristics of the solar irradiance simulator to be used for the high-temperature resistance test shall be those of the solar irradiance simulator used for efficiency testing of fluid heating external absorbers.

The external absorbers shall be mounted outdoors or in a solar simulator. Liquid heating external absorbers shall not be filled with fluid. All the fluid pipes except for one shall be sealed to prevent cooling by natural circulation of air.

A temperature sensor shall be attached to the absorber to monitor its temperature during the test. The sensor shall be positioned in the hottest region of the external absorber. The location shall be reported with the results. In case of liquid flat plate external absorbers, the hottest region can be assumed at two-thirds of the absorber height and half the absorber width. It shall be fixed firmly in a position to ensure good thermal contact with the absorber. The sensor shall be shielded from solar radiation.

The test shall be performed for a minimum of 1 h after steady-state conditions have been established (steady-state conditions can be assumed for absorber temperatures changes of less than ± 5 K for 30 minutes), and the external absorber shall be subsequently inspected for signs of damage.

TEST CONDITIONS

The set of reference conditions given in Table A2 shall be used for all climate classes.

Climate parameter	Value for all climate classes
Global solar irradiance on external absorber plane, G in W/m2	> 1000
Surrounding air temperature, ϑa in °C	20 - 40
Surrounding air speed in m/s	< 1

Table A2

When testing unglazed external absorbers without backside insulation, the external absorber shall be mounted onto a dark surface (α > 80 %) to rise maximum temperatures as worst-case condition.

RESULTS

The external absorber shall be inspected for degradation, shrinkage, outgassing and distortion.

The results of the inspection shall be recorded as in A3 together with the average values of solar irradiance (natural or simulated) on the external absorber plane, surrounding air temperature and speed, and absorber temperature (and the pressure of the suitable fluid in the absorber, if

that method is used) recorded during the test. Control functions which have been verified shall be described and reported with the test results.

External absorber tilt angle (degrees from horizontal): °
Average irradiance during test: W/m2
Average surrounding air temperature: °C
Average surrounding air speed: m/s
Average absorber temperature: °C
Duration of test: min

Table A3

A7. EXTERNAL THERMAL SHOCK TEST

OBJECTIVE

External absorbers may from time to time be exposed to sudden rainstorms on hot sunny days, causing a severe external thermal shock. This test is intended to assess the capability of an external absorber to withstand such thermal shocks without a failure.

APPARATUS AND PROCEDURE

The external absorber shall be mounted either outdoors or in a solar irradiance simulator. Liquid heating external absorbers shall not be filled with fluid. All except one of the fluid pipes shall be sealed to prevent Cooling by natural circulation of air. One shall be left open to permit free expansion of air in the absorber. In case of an air heating external absorber the inlet and outlet shall resist water penetration.

An array of water jets shall be arranged to provide a uniform spray of water over the front of the external absorber.

The external absorber shall be exposed to climatic conditions as described in Table A4 (class specified by the manufacturer) for a period of 1 h before the water spray. It is then cooled by the water spray for 15 min before being inspected.

The external absorber shall be subjected to two external thermal shocks.

TEST CONDITIONS

The set of reference conditions given in Table A4 shall be used. The specified operating conditions shall be:

- solar (or simulated solar) irradiance G greater than the value shown in Table A4 and,
- surrounding air temperature ϑa greater than the value shown in Table A4.

Climate condition	Value for climate class		
	Class C Temperate	Class B Sunny	Class A Very Sunny
Global solar irradiance on external absorber plane, G in W/m^2/minimum ambient temperature, ϑa in °C	800/10	900/15	1000/20
Values given are minimum values for testing. The same class shall be applied for irradiance and for irradiation values respectively.			

Table A4

The water spray shall have a temperature of less than 25 °C and a flow rate in the range 0,03 kg/s to 0,05 kg/s per square meter of external absorber aperture.

If the temperature of the water which first cools the external absorber is likely to be greater than 25 °C (for example if the water has been sitting in a pipe in the sun for some time), then the water shall be diverted until it has reached a temperature of less than 25 °C before being directed over the external absorber.

RESULTS

The external absorber shall be inspected for any cracking, distortion, water penetration or loss of vacuum. The results of the inspection shall be reported. The measured values of solar irradiance, surrounding air temperature, fluid channel temperature (if measured), water temperature and water flow rate shall also be reported.

A8. INTERNAL THERMAL SHOCK TEST

OBJECTIVE

External absorbers may from time to time be exposed to a sudden intake of cold heat transfer fluid on hot sunny days, causing a severe internal thermal shock, for example, after a period of shutdown, when the installation is brought back into operation while the external absorber is at an elevated temperature. This test is intended to assess the capability of an external absorber to withstand such thermal shocks without failure.

APPARATUS AND PROCEDURE

The external absorber shall be mounted either outdoors or in a solar irradiance simulator. Liquid heating external absorbers shall not be filled with fluid. One of its fluid pipes shall be connected via a shutoff valve to the heat transfer fluid source and the other shall be left open initially to permit the free expansion of air in the absorber and to permit the heat transfer fluid to leave the absorber (and be collected). If the external absorber has more than two fluid pipes, the remaining openings shall be sealed in a way that ensures the designed flow pattern within the external absorber.
The external absorber shall be exposed to climatic conditions as described in Table A4 (class specified by the manufacturer) for a period of 1 h before it is cooled by supplying it with heat transfer fluid for at least 5 min.
The external absorber shall be subjected to two internal thermal shocks.

This test is not applicable to those parts of the external absorber which are factory sealed. It is not applicable to those external absorbers in which heat transfer fluid is continuously flowing for protection purposes. In that case control(s) used to manage a no-flow condition shall be validated to be functional in such a way that any failure can be detected.

TEST CONDITIONS

Table A4 shall be used.

The specified operating conditions shall be:

- Solar (or simulated solar) irradiance G greater than the value shown in Table A4 - ambient air temperature ϑ_a greater than the value shown in Table A4

In case of a liquid heating external absorber the heat transfer fluid shall have a temperature of less than 25°C. The fluid flow rate shall be the maximum flow rate of the thermal performance test, at least 0.02 kg/s per square meter of external absorber aperture (unless otherwise specified by the manufacturer). The flow rate shall be the maximum recommended flow rate specified by the manufacturer.

RESULTS

The external absorber shall be inspected for any cracking, distortion, deformation, water penetration or loss of vacuum. The results of the inspection shall be reported. The measured values of solar irradiance, ambient air temperature, fluid channel temperature before starting

the test (if measured), inlet heat transfer fluid temperature and heat transfer fluid flow rate shall also be reported. Control functions which have been verified shall be described and reported with the test results.

A9. MECHANICAL LOAD TEST WITH POSITIVE OR NEGATIVE PRESSURE

OBJECTIVES

The mechanical load test with positive pressure is intended to assess the extent to which the solar assisted heat pump external absorber can resist the positive pressure load due to the effect of wind and snow.

The mechanical load test with negative pressure is intended to assess the deformation and the extent to which the external absorber and the fixings between the external absorber cover and external absorber mounting can resist uplift forces caused by the wind.

APPARATUS AND PROCEDURE

For the mechanical load test with positive pressure the external absorber shall be fixed on a stiff even ground using the manufacturers original equipment for mounting. Different methodologies may be used to apply load to the external absorber. If weight of material is used the external absorber shall be placed horizontally.

Note: The external absorber mounting comprises the equipment to connect the external absorber fixings with the supporting framework (e.g., roof anchor, roof hook). The external absorber fixing comprises the equipment to connect the external absorber box/frame with the external absorber mounting equipment (e.g., clamps, bolts).

- Using a foil and gravel or water:

On the external absorber a foil shall be laid and on the external absorber frame a wooden or metallic frame shall be placed, high enough to contain the required amount of gravel or similar material. The gravel, preferably type 2-32 mm, shall be weighed in portions and distributed in the frame so that everywhere the same load is created (If glazed pay attention to the bending of the glass), until the desired height is reached.

- Using suction cups:

The test can also be carried out using suction cups. The suction cups shall be distributed as even as possible on the external absorbers surface. The suction cups shall not hinder the movement of the external absorber cover caused by the mechanical load.

- Using air pressure on the external absorber cover:

Where additional seals are required for the test, such seals shall not hinder the movement induced by the applied air pressure in any way.

For the mechanical load test with negative pressure the external absorber can be placed horizontally and the manufacturers' original equipment for mounting shall be used. Different methodologies may be used to apply load to the external absorber.

A lifting force which is equivalent to the specified negative pressure load shall be applied evenly over the external absorber or cover if applicable. If the cover has not been loosened, or any other failure which could be defined as major, at the final pressure, then the pressure may be stepped up until failure occurs. The time between each pressure step shall be the time needed for the pressure to stabilize.

- Method (a): The load may be applied to the external absorber cover by means of a uniformly distributed set of suction cups.

- Method (b): For external absorbers which have an almost airtight external absorber box, the following procedure may be used to create a negative pressure on the cover. Two holes are made through the external absorber box into the air gap between the external absorber cover and absorber, and an air source and pressure gauge are connected to the external absorber air gap through these holes. A negative pressure on the cover is created by pressurizing the external absorber box. For safety reasons the external absorber shall be encased in a transparent box to protect personnel in the event of failure during this test.

Where flashings or sealing kits that are an integral part of the external absorber provide any uplift resistance, they should be included in the test.

TEST CONDITIONS

The test pressure shall be 2400 Pa (positive and negative), 5400 Pa (positive) or as specified by the manufacturer. The reference area to be used is the gross area of the external absorber.

A permanent deformation should be assigned to a load value, while it is completely relieved after every load increment and the distortion is measured compared to the beginning of the test sequence.

RESULTS

A failure can be the permanent deformation of the external absorber or the fixings. The pressure at which any failure of the external absorber cover or the box or fixings occurs shall be reported together with details of the failure according. If no failure occurs, then the maximum pressure

which the external absorber sustained shall be reported. Control functions which have been verified shall be described and reported with the test results.

A10. FINAL INSPECTION

When the tests have been completed, and the same external absorber is not going to be used for the performance test, the external absorber used for the test shall be dismantled and inspected. All abnormalities shall be documented and accompanied by photographs. The external absorber and all its components shall be described and be photographed (including glazing, absorber, absorber coating, insulation, housing, inlet and outlet ports, glazing supports and retainers, seals, gaskets, back sheet, etc. where applicable).

Specific assessment criteria for each of the tests listed in Table 2 of Clause 8.1 are listed in the respective test paragraphs. The term "no major failure", denotes that none of the following occurs:

- Fluid channel leakage (in case of liquid heating external absorbers only) or such deformation that permanent contact between absorber and cover is established;
- Breaking or permanent deformation of cover or cover fixing;
- Breaking or permanent deformation of external absorber fixing points or external absorber box;
- Accumulation of humidity in form of condensate on the inside of the transparent cover of the external absorber exceeding 10% of the aperture area. In case of an open loop air heating external absorber for limited periods of time this criterion maybe exceeded.
- Any other abnormality resulting in a significant reduction of performance or service lifetime.

A11. TEST REPORTS

Test reports shall be issued in accordance with MCS 011.Test reports may be issued on single tests or complete test sequences.

For the external absorber, and whenever is applicable, the Appendix from ISO 9806:2017 shall be used.

APPENDIX B – PERFORMANCE DATA TEMPLATE

The following data shall be incorporated or appended to the product certificate in accordance with clause 4.5:

For hybrid heat pump units, all data below shall be provided for the heat pump component only.

1) Manufacturer, Model & URL to Manufacturers website for more information.

2) The SCOP values, based on those calculated from MCS 026, for all flow temperatures at 1°C increments between 35°C and 65°C.

3) The declared peak thermal capacity values for heat pumps in kW (including defrost) at the following intervals:

    - Air-to-Water Heat Pumps at ambient dry bulb external air temperatures between -7°C and +7°C at 1°C intervals, with flow temperatures between 35°C and 65°C at 5°C degree intervals.
    - Air-to-Air Heat Pumps as ambient dry bulb external air temperatures between -7°C and +7°C at 1°C intervals, with outlet air temperature of 20°C.
    - Ground-to-Water Heat Pumps at ambient ground temperatures of 0°C and 10°C and Water-to-Water Heat Pumps at a water temperature of 10°C, with flow temperatures between 35°C and 65°C at 5°C degree intervals.

      Note: Declared capacity for Ground-to-Water Heat Pumps at 10°C is only *required where available*.

4) The sound power level in dB(A), as defined and tested in Section 6.

Example templates for how the data required under requirement (3) might be presented:

Air-to-Water Heat Pumps

FLOW TEMPERATURE / AMBIENT Inlet dry bulb temperature	kW Output @ 35°C	kW Output @ 40°C	kW Output @ 45°C	kW Output @ 50°C	kW Output @ 55°C	kW Output @ 60°C (High Temperature units Only)	kW Output @ 65°C (High Temperature units Only)
+7°C							
+6°C							
+5°C							
+4°C							
+3°C							
+2°C							
+1°C							
0°C							
-1°C							
-2°C							
-3°C							
-4°C							
-5°C							
-6°C							
-7°C							

Air-to-Air Heat Pumps

FLOW TEMPERATURE / AMBIENT Inlet dry bulb temperature	kW Output @ 20°C
+7°C	
+6°C	
+5°C	
+4°C	
+3°C	
+2°C	
+1°C	
0°C	
-1°C	
-2°C	
-3°C	
-4°C	
-5°C	
-6°C	
-7°C	

Ground-to-Water Heat Pumps

FLOW TEMPERATURE / Source Design Temperature	kW Output @ 35°C	kW Output @ 40°C	kW Output @ 45°C	kW Output @ 50°C	kW Output @ 55°C	kW Output @ 60°C (High Temperature units Only)	kW Output @ 65°C (High Temperature units Only)
0°C							
+10°C							

Water-to-Water Heat Pumps

FLOW TEMPERATURE / Source Design Temperature	kW Output @ 35°C	kW Output @ 40°C	kW Output @ 45°C	kW Output @ 50°C	kW Output @ 55°C	kW Output @ 60°C (High Temperature units Only)	kW Output @ 65°C (High Temperature units Only)
+10°C							