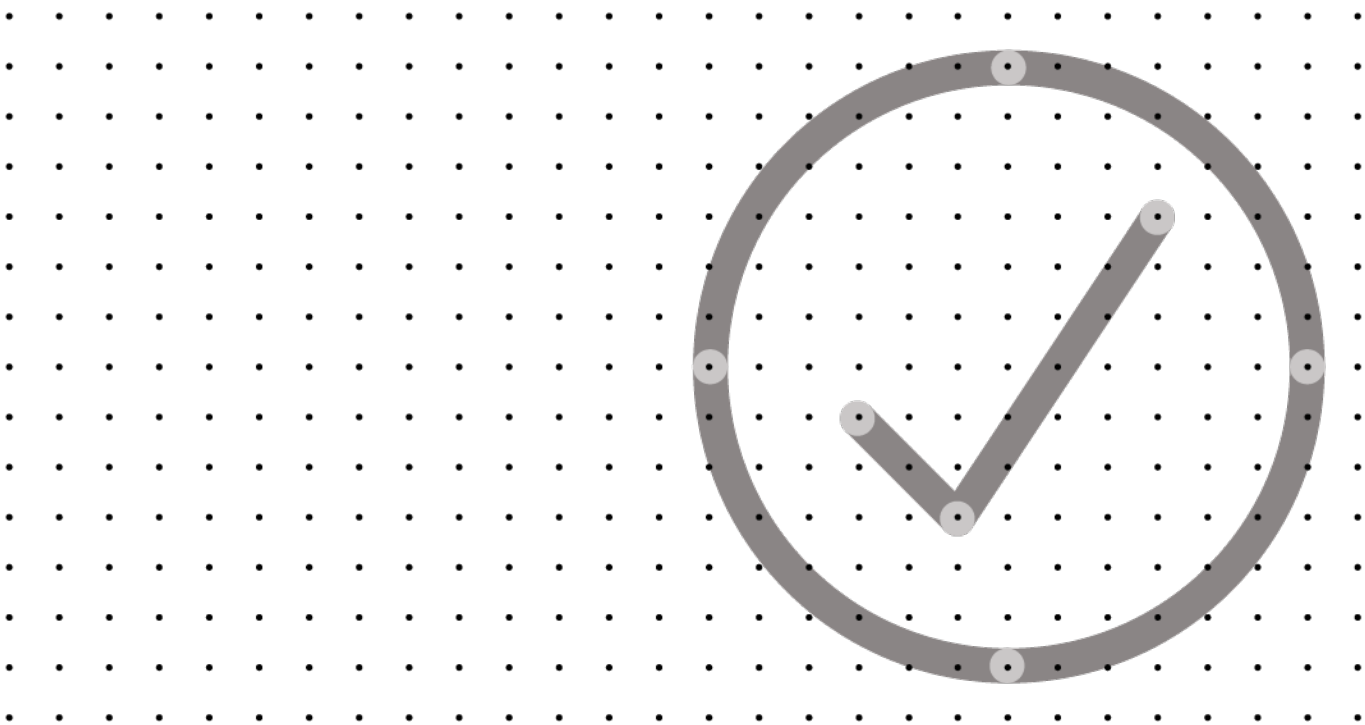
STANDARDS DOCUMENT

MIS 3001: 2025 ISSUE 1.0

MCS 2025

Solar Heating: Installation Standard



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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

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 solar heating systems to supply solar heating energy for space heating and/or domestic hot water for permanent buildings. The scope of this MCS Installation Standard is limited to installations with a design heat load requirement of up to 45 kW_{th}.

2 DEFINITIONS

Refer to Installer Operating Requirements for general definitions (not specific to solar heating). For technical definitions please see below. Where a definition does not appear in this Standard, informative reference is made to ISO 9488 (solar energy – Vocabulary).

Term	Definition
Solar heating system	System composed of solar heating collectors and other components for the delivery of thermal energy.
Solar heating collectors	Device designed to absorb solar radiation and to transfer the thermal energy

3 DESIGN & INSTALLATION REQUIREMENTS

3.1 LEGISLATION

3.1.1 All applicable legislation and directives must be met in full.

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

3.1.2 Contractors shall ensure, and be able to demonstrate, that they are aware of all current applicable legislation.

3.1.3 The contractor shall ensure the building is assessed by a competent professional experienced in solar heating 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) is not compromised.

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

Note: The installation of a solar heating system presents a unique combination of hazards – due to risk of scalding and burning, falling and simultaneous manual handling difficulty. All of these hazards are encountered as a matter of course on a building site, but rarely all at once. While roofers may be accustomed to minimising risks of falling or injury due to manual handling problems, they may not be used to dealing with the risk of scalding and burning. Similarly, heating engineers would be familiar with scalding and burning hazards but not with handling large objects at heights.

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.

3.2 MANUFACTURERS' 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 solar heating product(s) specified shall be listed on the MCS website (www.mcscertified.com). These listings include solar heating products both MCS certified (according to MCS 004) and by other schemes that MCS considers equivalent.

3.3.2 Solar heating products mounted above, or integrated into, the roofs of buildings should utilise installation kits or components tested and approved according to MCS 012 The Roof Fixing Standard.

3.3.3 The mounting system used must be compliant with current Building Regulations for weather-tightness, fire and wind resistance. Use of mounting equipment approved according to MCS 012 The Roof Fixing Standard may be a means of demonstrating compliance.

3.3.4 All components used to mount the solar panels shall be specifically approved by the manufacturer(s) of those components to work together unless described by the manufacturer(s) as universally compatible with other manufacturers' components.

3.3.5 Where the MCS 012 certification of a mounting system specifically refers to its compatibility with a named solar heating product (or products) then only those Solar Thermal products shall be used.

3.3.6 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 DESIGN AND INSTALLATION

3.4.1 All work under this Standard work shall be carried out:

a) with adequate and proper materials which;
   i) are appropriate for the circumstances in which they are used;
   ii) are adequately mixed or prepared, and;
   iii) are applied, used or fixed so as adequately to perform the functions for which they are designed; and;
b) in a workmanlike manner.

3.4.2 The solar heating array layout should allow access for maintenance and emergency services.

Note: For larger installations, special consideration should be given to:

- *The provision of access/walkway around the perimeter of the array.*
- *Arranging larger arrays into smaller blocks with access corridors between.*
- *The provision of permanent protection over fragile roof elements such as skylights.*
- *The provision and type of permanent access ladders.*

3.4.3 The contractor must undertake an assessment to identify and assess the risk of exposure to legionella bacteria from the perspective of the solar heating system installation, operation and decommissioning. The contractor must implement the steps needed to prevent or control the risks identified in the assessment.

3.4.4 The solar heating system shall:

- Be designed so that it operates effectively assuming no user intervention.
- Be designed and installed to prevent the export of non-solar generated heat to the solar heating array.
- Be designed and installed to incorporate a safety device to control the risk of over-pressure in system components.
- Be designed such that any release to atmosphere of any high temperature fluid (vapour or liquid) is either safely contained in a suitable vessel or discharged externally.
- Be designed and installed such that any auxiliary heating system has a control interlock wherever possible.
- Be designed so that the solar heating system performance is optimised by controlling the timing of backup (auxiliary / non-solar) sources of water heating.
- Be designed such that there is auto-resume of normal operation after stagnation without user intervention (often referred to as "intrinsically secure").

3.4.5 The solar heating system should incorporate hot water storage that:

a) Where vented hot water storage, complies with BS 1566-1
b) Where unvented hot water storage, complies with BS EN 12897
c) Includes a dedicated solar pre-heat storage volume which is either:

i) 80% of the daily hot water demand for pre-heat vessels, or
ii) 25 litres per net square meter of the solar collector absorber area (where the collector area is measured as the effective aperture area or net absorber area, whichever the smaller).

3.4.6 All pipes of a solar heating system transferring heat should be insulated to reduce heat loss, except for branch pipes to expansion vessels, to a conductivity no greater than 0.040W/mK and with an insulation thickness at least one and half times the pipe diameter (or so as to provide an equivalent heat loss measured at 50°C).

Note: For the solar primary circuit, the minimum insulation thickness set out in table 2 below is deemed to satisfy both this requirement and Part L of the Building Regulations in England and Wales.

Table 2: Minimum required wall thickness for High Temperature EPDM based rubber insulation products.

Minimum required wall thickness for High Temperature EPDM based rubber insulation products used for solar primary circuits assuming a mean flow temperature of 50°C and a conductivity of 0.040 W/mK						
	Pipe Outside Diameter					
	10mm	12mm	15mm	22mm	28mm	35mm
Minimum insulation wall thickness	9mm	13mm	13mm	19mm	25mm	32mm

3.4.7 Where the pipes and cables of the solar heating system pass through the building's insulated structure, these services should be designed to minimise the risk of air infiltration.

3.4.8 The solar heating system should be designed and installed to allow for safe and environmentally responsible decommissioning.

3.5 CONTROLS, METERING & COMMUNICATION

Controls

3.5.1 Where a solar heating system utilises pumped primary circulation then:

a) The system shall be controlled by a temperature-sensitive device that accurately measures the difference in temperature between the absorber and the pre-heat storage.

b) The settings for adjustable values of differential and hysteresis within the system should be provided to the customer.

c) The system controller should include a manual override to engage circulation for commissioning in all weather conditions.

Displays and Metering

3.5.2 A means of recording and displaying the heat generation of the system should be installed.

Note: This does not require the installation of a separate calibrated heat meter; many differential temperature controllers used in solar heating systems include a function to calculate and display the amount of heat delivered by the solar heating system.

3.5.3 The solar heating system should include a means of accurately indicating the circulation flow rate within the system's primary circuit.

3.5.4 Where a solar heating system utilises a pressurised primary circuit, a pressure gauge shall be included which displays the pressure within the circuit.

3.5.5 The means of recording heat generation, be it the solar heating system controller or a dedicated heat meter (if fitted), the means of indicating system flow rate and, where appropriate, the means of indicating system pressure, should be accessible and readable by the customer without requiring the use of a tool, ladder or torch.

3.5.6 For systems utilising thermosiphonic primary circulation, the hot water temperature shall be indicated by means of a thermometer or temperature indication device on the hot water tank in a clearly visible location, or on a remote device within the property.

Data Communication & Security

3.5.7 A means of indicating to the customer within 48 hours of the system ceasing to operate, or beginning to operate abnormally, should be provided.

Note: The installation of a solar controller with an automatic warning light and/or error message function and/or heat quantity measurement capability installed in accordance with clause 3.6.2 could satisfy this requirement.

3.5.8 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 relayed to the customer.
- Relevant components in the solar heating system should comply with the Standard ETSI Technical Specification 303 645 Cyber Security for Consumer Internet of Things.

3.5.9 For installations requiring local area network, home area network, and/or internet access in commercial and industrial premises, permission shall be obtained from those responsible for the client organisation's information technology and information security policies and procedures.

3.6 SAFETY AND DURABILITY

Note: This Section is not intended to be a comprehensive list of safety and durability features of a professionally designed, installed and commissioned solar heating system. To be safe and durable, solar heating system installations must be compliant with all relevant regulations (Section 5.1.8), with the Water Regulations and Building Regulations being relevant to all solar heating system installations. This Section is intended to compliment Regulations (Section 5.1.8) and the MCS Contractor's installation experience (Section 8.1.1) by highlighting some of the key elements of the solar heating system design and installation which require particular attention to detail to ensure the system is safe and durable.

Fire Performance

3.6.1 The contractor shall be able to demonstrate that the installation of the solar heating products has not affected the fire performance of the roof.

Note: This can be demonstrated by:

a) Mounting above an existing non-combustible roof covering (pitched roofs).

b) Where in-roof (forming the main roof covering) using an in-roof kit with the appropriate fire performance rating for the proposed location of the array. See Appendix B for a worked example and guidance on fire classification relevant to distance from boundaries reproduced from Approved Document B applying in England & Wales.

3.6.2 Care should be taken to ensure that the installation of the solar heating system meets the fire safety requirements set out in Building Regulations in relation to the fire safety and suitability of materials and products used (under all anticipated operating and stagnation conditions) and with respect to the fire resistance of the building.

Climate Conditions

3.6.3 Solar heating systems shall incorporate a means to protect the system from damage or malfunction due to freezing without the need for user intervention or electricity.

High Temperatures, High Pressure and Burn Risk

3.6.4 When operating, none of the solar heating system components shall be exposed to temperatures or pressures outside their designed range and safeguards shall be implemented to ensure pressures do not exceed the pressure rating of the weakest component. The design shall include mechanisms to ensure than an over-pressure event does not pose a risk to the long-term durability of the solar heating system.

3.6.5 All solar heating system components transferring or storing heat shall be insulated to protect against burns, except for branch pipes to expansion vessels.

3.6.6 The solar heating system shall incorporate safety devices to ensure that the temperature of the stored water does not exceed 100°C at any time.

3.6.7 The solar heating system shall incorporate a means to limit the temperature of the water at all points of use after an assessment of scald risk factors.

Note: For domestic applications this requirement might be met through the provision of thermostatic mixing valves (TMVs) within 2,000mm of all points of use set at no more than 46°C (or lower dependent upon the point of use in question) OR the provisions of TMVs at the outlet(s) from the hot water cylinder set at 55°C – 60°C OR the provision of a thermostatic device to limit the solar input to the hot water cylinder OR a combination of the above.

3.6.8 In the case when the solar heating system is supplying pre-heated water to the cold inlet of an instantaneous water heating appliance, the design shall ensure that the pre-heated water is at a temperature no higher than the maximum cold inlet temperature for the appliance as specified by the manufacturer.

Legionella and Water Supply

3.6.9 The solar heating system shall incorporate an automatic means to control bacterial growth to ensure safe operation, and must include protection against Legionella bacteria (Legionnaires' disease: The control of legionella bacteria in water systems. Approved Code of Practice and guidance on regulations L8, Health & Safety Executive).

3.6.10 The solar heating system shall ensure the wholesome water supply is not contaminated. This may include the installation of devices to prevent backflow or back-siphoning where applicable.

Heat Transfer Fluid

3.6.11 All the solar heating system components in contact with the heat transfer fluid shall have been designed to work with the heat transfer fluid used.

3.6.12 The solar heating system shall have adequate provision for the expected expansion of the heat transfer fluid and the design shall ensure that the loss of heat transfer fluid during standard operating conditions (including stagnation) is minimised.

3.6.13 The design of the solar heating system shall ensure that future safety is not significantly affected by mineral deposits, sludge, ice or other solids forming in the solar primary circuit.

3.7 SITE SPECIFIC ISSUES

3.7.1 The solar heating array shall not adversely affect the weather tightness or structural integrity of the building to which it is fitted. The system should be designed and installed to ensure this is maintained for the life of the system.

3.7.2 Where the existing roof covering is under warranty, then the roof warranty provider should be consulted to establish whether warranties will be invalidated by the installation.

3.7.3 Where any existing warranty may be invalidated by the proposed installation, the contractor shall notify the customer in writing and obtain explicit written agreement from the customer if the installation is to proceed.

Note: a clause in the contractor's standard terms & conditions would not satisfy this requirement.

Installation on Pitched Roofs

Note: Pitched roofs are defined as those with an angle greater than 10° but less than 70° to the horizontal.

3.7.4 The contractor shall ensure that the roof structure is checked by a suitably competent person to ensure it can withstand the loads imposed by the solar heating array.

3.7.5 For the typical roof structure types shown in Table 3, the calculation methodologies given should be used.

3.7.6 Where the roof structure is in any way unusual, or there is any doubt whatsoever, a qualified structural engineer shall be consulted.

Note: An unusual roof structure would include any that:

- *Is not shown in Table 1.*
- *Shows signs of structural distress.*
- *Shows signs of post construction modification (e.g. removal of timbers, notching, change of roof covering to a heavier material).*
- *Where the roof pitch is particularly shallow (i.e. less than 30° to the horizontal).*
- *The roof design has increased potential for snow build-up (e.g. dormers, valleys, parapets etc).*

3.7.7 Solar heating products should not be mounted within 400 mm from any edge of a domestic roof unless specific measures are taken to:

- Resist the increased wind uplift forces in the edge zone through additional fixings and, where necessary, additional roof timbers for those fixings.
- Ensure ridge-tiles remain secure.
- Ensure rainwater run-off patterns are not affected.
- Ensure build-up and shedding of snow cannot cause injury or property damage.
- Reduce nuisance from wind noise.

3.7.8 Where necessary to ensure rooftiles or slates are not displaced creating gaps greater than those pre-existing the installation, then those tiles or slates shall be notched or flashed as appropriate.

3.7.9 When screw-fixing brackets directly to metal roof cladding the roof-sheet thickness shall be checked to ensure that it is compatible with the fixing bracket and screws and it can withstand the additional wind uplift introduced by the solar heating array.

3.7.10 The fixing of the metal roof cladding to the main roof structure shall be checked to ensure that it is capable of transferring the imposed and wind uplift loads introduced by the solar heating array.

Installation on Flat Roofs

Note: Flat roofs are defined as those with an angle less than 10° to the horizontal.

3.7.11 For mechanically fixed systems:

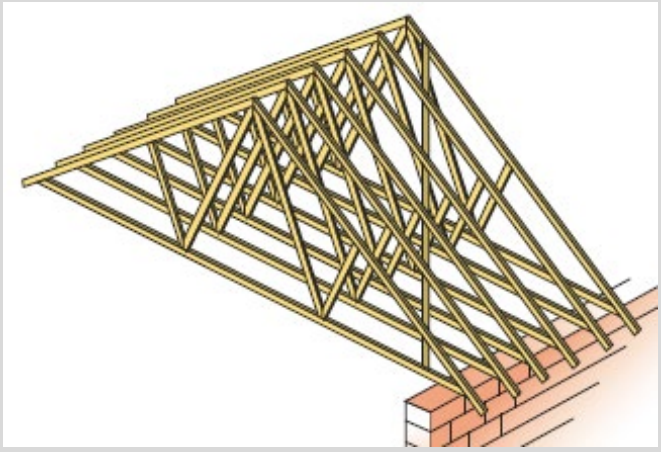
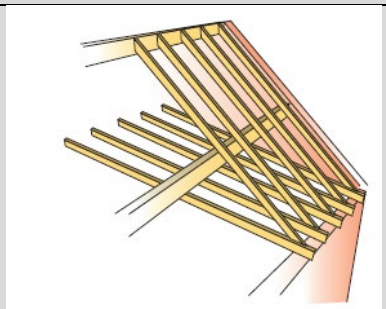
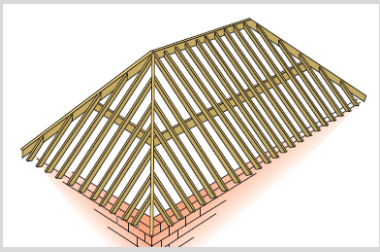
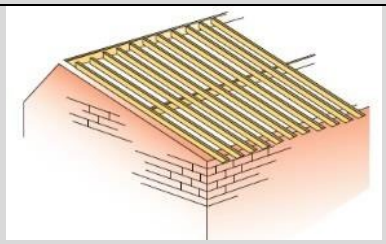
a) When fixing to an existing solid deck (e.g. concrete, brick or similar), a condition survey should be carried out and pull out tests undertaken.
b) Where it is not possible to reliably calculate the pull-out value, for example, for a concrete roof or where the roof build-up is not possible to ascertain the roof structure from the survey, pull out tests should be undertaken in accordance with the technical guidance published by the Single Ply Roofing Association "Site pull-out test protocol for flat roofs" (S15-19).

3.7.12 For ballasted systems:

c) The pressure coefficients shall be taken from BRE Digest 489 'Wind loads on roof-mounted photovoltaic and solar heating systems' or from recognised test data commissioned for the specific purpose of determining the wind loads on solar systems.
d) A protection/slip layer shall be used which is confirmed as compatible with the waterproofing layer(s).
e) The calculation of resistance to sliding for ballasted mounting systems shall use a coefficient of friction of 0.3 unless the material combination (including slip layer) has been tested in accordance with MIS 3002 Appendix D in which case the test results shall be used.
f) Where installed on granular substrates (e.g. gravel or green roofs) the calculation of resistance to sliding shall use a test value in accordance with MIS 3002 Appendix D or shall be mechanically restrained against sliding (see note).
g) The wind resistance calculation shall declare the coefficient of friction used and where the coefficient of friction is greater than 0.3 the value should be evidenced by a test report.
h) A qualified structural engineer shall be consulted to ensure the roof is able to withstand the imposed load from both the solar heating array and the proposed ballast.

Note: Methods to mechanically restrain the system against sliding include the installation of a kerb in front of the solar heating array or the use of tether cables attached to an appropriate fixed point on the roof.

Table 3: Typical roof structure types and roof loading methods

Diagram	Construction diagram type of roof	Typical methods
Roof constructed from Timber Trussed Rafters 		Method 1: Assuming a typical **design dead load** of 0.785 kN/m^2, deduct the load of the existing roof covering to give the maximum allowable residual load available for the solar heating array.
		Method 2: (not generally applicable where the roof pitch exceeds 60°): Assuming a typical **design imposed load** of 0.75 kN/m^2, deduct the likely snow load for the location taken from Eurocode-1 (BS EN 1991-1) to give the maximum allowable residual load available for the solar heating array.
	Traditional cut roofs constructed from timber rafters/purlins - gable ended	Calculate the maximum dead load for the rafters and purlins using the timber research and development association (TRADA) Span tables; deduct the load of the existing roof covering to give the maximum allowable residual load available for the solar heating array.
	Traditional cut roofs constructed from timber rafters/purlins - with hips and/or valleys	Consult a structural engineer.
	Asymmetric duo-pitched roofs constructed from rafters and purlins	Consult a structural engineer.

4 COMMISSIONING

4.1 COMMISSIONING

4.1.1 A pre-commissioning checklist should be used which is customised to incorporate any pre-commissioning checks recommended by the manufacturer of any of the components being used in the solar heating system.

4.1.2 The solar heating system shall be commissioned according to a documented procedure to ensure that the system is safe, has been installed in accordance with the requirements of this Standard and the manufacturers' requirements, and is operating correctly in accordance with the system design.

4.1.3 The contractor should complete a suitable commissioning checklist when commissioning the solar heating system

Note: An example of a suitable commissioning checklist is shown in Appendix A.

4.2 LABELLING

4.2.1 The following labels shall be fixed to the appropriate part of the solar heating system:

- Showing the contact details of the solar heating system installer/commissioner.
- Warning of the possible discharge at the pump station or at the pressure relief valve, if installed separately from the pump station.

5 PUBLICATIONS, REFERENCES 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 Standard and they are able to further research topics if they need to do so.

MCS Standards:

- MCS 004 The Solar Thermal Standard (Product).
- MCS 024 Solar Domestic Hot Water Energy Calculator.
- CC 003 Solar Thermal Compliance Certificate Template.
- MIS 3002 The Solar PV Standard (Installation).
- MCS 012 Product Certification Scheme Requirements: Pitched Roof Installation Kits.

Standards, guidance and documents including with regard to health and safety:

- Construction (Design and Management) Regulations 2015. Guidance on Regulations (Series Code: L153).

- HSE Approved Code of Practice (ACOP) L8 (Fourth edition) Legionnaires' disease. The control of legionella bacteria in water systems.
- HM Government Domestic Building Services Compliance guide 2013 edition (incorporating 2018 amendments).
- Level 3 Solar Thermal Hot Water Systems Training Manual (LCL Awards, BPEC or City & Guilds).

Selected Solar Thermal system Design Guidance:

- Chartered Institution of Building Services Engineers (2016) The solar heating design and installation guide.
- CORGIdirect (2012) Domestic solar hot water systems.
- Deutsche Gesellschaft für Sonnenenergie (2005) Planning and installing solar thermal systems: a guide for installers, architects, and engineers.

Related MCS Standards available from: https://mcscertified.com

- MIS 3004 Requirements for MCS Contractors undertaking the supply, design, installation, set to work, commissioning and handover of solid biofuel heating systems.
- MIS 3005 Requirements for MCS Contractors undertaking the supply, design, installation, set to work, commissioning and handover of microgeneration heat pump systems.

Solar Thermal standards available from: https://shop.bsigroup.com

- BS 5918:2015 solar heating systems for domestic hot water – Code of practice for design and installation.
- BS EN 12975-1:2006+A1:2010 Thermal solar systems and components. Solar collectors. General requirements.
- BS EN 12976-1:2017 Thermal solar systems and components. Factory made systems. General requirements & BS EN 12976-2:2019 Thermal solar systems and components. Factory made systems. Test methods.
- BS EN 12977-1: 2018 Thermal solar systems and components – Custom built systems. General requirements for solar water heaters and combisystems.
- BS EN 12977-3: 2018 Thermal solar systems and components – Custom built systems. Performance test methods for solar water heater stores.
- BS EN ISO 9806:2017 Solar energy – solar thermal collectors – test methods.

Controller Standards available from: https://www.etsi.org

- ETSI EN 303 645: CYBER Cyber Security for Consumer Internet of Things: Baseline Requirements.

Standard Assessment Procedure (SAP) available from: https://www.bregroup.com/sap

- The Government's Standard Assessment Procedure for Energy Rating of Dwellings (SAP 2012 Edition).
- The Government's Standard Assessment Procedure for Energy Rating of Dwellings (SAP 10 Edition).

Construction Standards: https://shop.bsigroup.com & https://www.brebookshop.com

- BS EN 1991-1-1:2002 Eurocode 1. Actions on structures. General Actions. Densities, self-weight, imposed loads for buildings.
- BS EN 13374:2013+A1 Temporary edge protection systems. Product specification. Test methods.
- BRE Digest 489 Wind loads on roof-mounted photovoltaic and solar thermal systems.
- BRE Digest 495 Mechanical installation of roof-mounted photovoltaic systems
- Single Ply Roofing Association (SPRA) Site Pull-Out Test Protocol For Flat Roofs (S15/19).

Regulations available from: http://www.legislation.gov.uk

- Supply (Water Fittings) Regulation 1999, The Water Supply (Water Fittings) (Scotland) Byelaws 2014 and The Water Supply (Water Fittings) Regulations (Northern Ireland) 2009.
- Pressure Equipment Regulations 1999.
- The Gas Safety (Installation and Use) Regulations 1998.
- Electrical Safety, Quality and Continuity Regulations 2002 and Electricity at Work Regulations 1989.
- Control of Substances Hazardous to Health Regulations 2002 (COSHH).

The Building Regulations:

- England and Wales available from: https://www.planningportal.co.uk
- Northern Ireland available from: http://www.buildingcontrol-ni.com
- Scotland available from: https://www.gov.scot

APPENDIX A – EXAMPLE COMMISSIONING CHECKLIST

Note: Please refer to any manufacturer's commissioning checklists that apply and record information requirements as appropriate as this may effect equipment warranties.

Commissioning Checklist		
Installation address	Reference:	
	Date:	
	Test Instruments:	
For solar primary sealed systems – fully-filled and drainback. Enter key specification details and adjustment variables		
User instructions explained and handed over	[ ]	Yes/No
Decommission schedule for collector and cylinder left on site	[ ]	Yes/No
Installation and maintenance instructions left on site	[ ]	Yes/No
Specialist maintenance schedule (including frequency, maintenance andlist of parts to be replaced during normal maintenance) left on site	[ ]	Yes/No
Store commissioning certificate completed and signed	[ ]	Yes/No
System drawing indicating hydraulic, valve and electrical connections	[ ]	Yes/No
Conformity declarations for EU directives	[ ]	Yes/No
All documentation to be kept visibly near store protected from heat,water and dust. Name of location where documentation is left		
Glazing format of solar collector	Tube / Flat	
Absorber type	Selective / Non-selective	
Net absorber or aperture area	[ ]	m^2
Copy of EN 12975 conformity certificate left on site	[ ]	Yes/No
If no EN 12975 conformity, what is max design temperature	[ ]	°C
If no EN 12975, will primary system prevent collector overheating	[ ]	Yes/No
Manufacturer's name		
Unique serial no		
Maximum stagnation temperature of collector	[ ]	°C
Maximum design pressure of collector	[ ]	Bar
Maximum design pressure of pre-heat store exchanger	[ ]	Bar
Primary pressure limit of weakest component	[ ]	Bar
System pressure setting adjusted when cold	[ ]	Bar
Minimum allowable primary system pressure/level before user action required	[ ]	Bar
Procedure for user to follow if primary pressure/level is below limit		
Location of primary system pressure gauge		
Frequency of regular test of pressure safety device	Yearly/Biennially	
Location of pressure safety device		
Location of electrical fused isolating switch		
Fuse rating	[ ]	Amps
Electrical controls and temperature sensors operating correctly	[ ]	Yes/No

Non-solar DHW heating fitted with a thermostatresponding to the solar pre-heat store temperature	[ ]	Yes/No
Differential pump control setting	[ ]	°C
Hysteresis setting about differential switching points	[ ]	°C
Expansion vessel pre-charge (Bar), or drainback vessel expansion volume (Litres)	[ ]	Bar/Litres
Expansion or drainback vessel capacity	[ ]	Litres
Expansion capacity suitable to be inherently secure	[ ]	Yes/No
Written warning left on site if there is potentially no automaticresumption of normal operation after stagnation	Yes/No/Not required	
Lowest ambient temperature of primary system without freeze damage	[ ]	°C
The heat transfer fluid provides freeze protection to	[ ]	°C
Type of transfer fluid	Water/Glycol	
Maximum Ambient temp for pump	[ ]	°C
Minimum ambient temperature for pump	[ ]	°C
Circulation rate setting	[ ]	Litres per minute
Noise at full circulation acceptable	[ ]	Yes/No
Direction of circulation through collector and heatexchanger matched to sensor positions	[ ]	Yes/No
If drainback, pipes fall greater than 1:33 or filled with antifreeze	[ ]	Yes/No
Solar pre-heat store type	Combined with DHW / Separate from DHW	
Solar primary heat exchanger type	Copper/Steel/Plain/Ribbed	
Solar primary heat exchanger area	[ ]	m^2
Volume of dedicated solar pre-heat	[ ]	Litres
Location of DHW isolation valve		
Method of anti-scalding in DHW distribution	Pump control/ thermostatic mixer valve	
Location of digital temperature gauge fitted tomonitor risk of DHW overheating		
Limescale risk to heat exchanger	Low/Medium/High	
Limescale control in heat exchanger	Cleaning hatch/ Thermostat on primary circulation	
Expected annual delivered solar energy to taps	[ ]	kWh
Expected annual solar fraction of DHW	[ ]	per cent
Daily DHW load assumption	[ ]	Litres per day at °C
Date of site visits for bacterial, water quality and access risk assessments		
Commissioned by		
On behalf of		
Date system commissioned and handed over		

APPENDIX B – FIRE RATING WORKED EXAMPLE

Approved Document B (2019 edition) applicable in England & Wales provides the following table:

Table 12.1 Limitations on roof coverings

Designation[1] of covering of roof or part of roof	Distance from any point on relevant boundary			
	Less than 6m	At least 6m	At least 12m	At least 20m
B_{ROOF}(t4)	●	●	●	●
C_{ROOF}(t4)	○	●	●	●
D_{ROOF}(t4)	○	●[2][3]	●[2]	●
E_{ROOF}(t4)	○	●[2][3]	●[2]	●[2]
F_{ROOF}(t4)	○	○	○	●[2][3]

● Acceptable.

○ Not acceptable.

NOTES:

Separation distances do not apply to the boundary between roofs of a pair of semi-detached dwellinghouses and to enclosed/covered walkways. However, see Diagram 5.2 if the roof passes over the top of a compartment wall.

Polycarbonate and uPVC rooflights that achieve a class C-s3, d2 rating by test may be regarded as having a B_{ROOF}(t4) designation.

1. The designation of external roof surfaces is explained in Appendix B.
2. Not acceptable on any of the following buildings.
   a. Dwellinghouses in terraces of three or more dwellinghouses.
   b. Any other buildings with a cubic capacity of more than 1500m^3.
3. Acceptable on buildings not listed in (1) if both of the following apply.
   a. Part of the roof has a maximum area of 3m^2 and is a minimum of 1500mm from any similar part.
   b. The roof between the parts is covered with a material rated class A2-s3, d2 or better.

A developer wants to install solar collectors onto a pair of semi-detached houses which has a cubic capacity of 1000m^3 and bounded on three sides by other properties and the fourth by a road as shown in the diagram. The relevant boundaries are with the adjoining properties and the centre-line of the road.

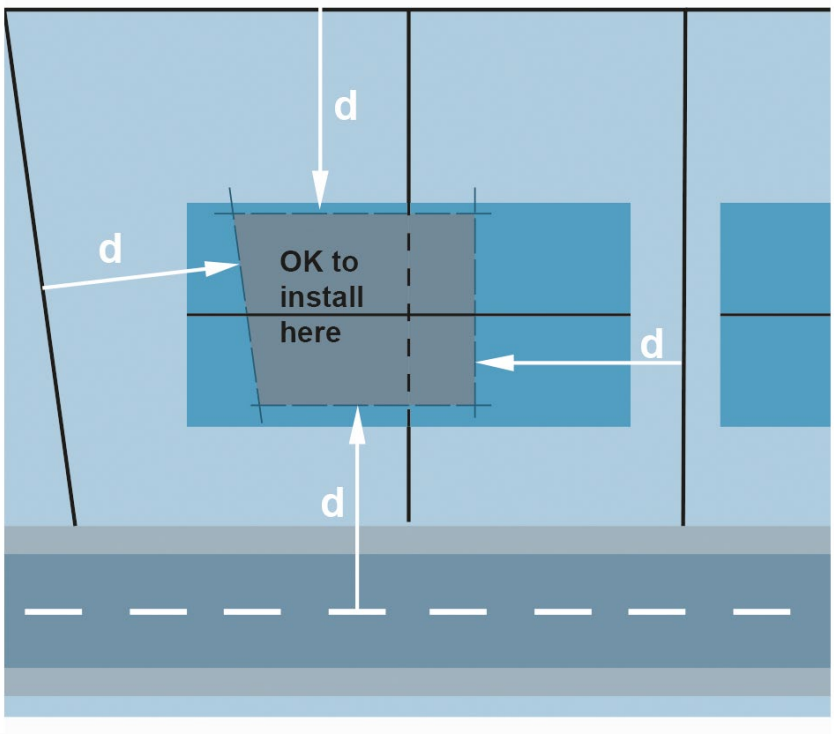


Figure 1

1. B_{roof} rated solar kit - the solar collectors can be installed anywhere and in any amount of roof covering.
2. C_{roof} rated solar kit - the solar collectors can be installed within a bounded area with the distance d ≥ 6m.
3. D_{roof} and E_{roof} rated solar kit – the solar collectors can be installed within a bounded area with the distance (because in this example footnote 2 in the table is satisfied):
    a. d ≥ 6m and < 12m provided that the panels are installed in areas no bigger than $3m^2$ with a gap of 1.5m covered with tiles between areas which themselves have a classification no less than A2-s3, or d2 or
    b. d ≥ 12m
4. F_{roof} rated solar kit – the solar collectors can be installed as in point 3b. above but within a bounded area with the distance d ≥ 20m