Technical and Specification Information

Greenskies Solar-Lux series
Greenskies Solar-Lifestyle series
Greenskies Solar-Lito series

The **Greenskies** range of solar thermal panels

NEW

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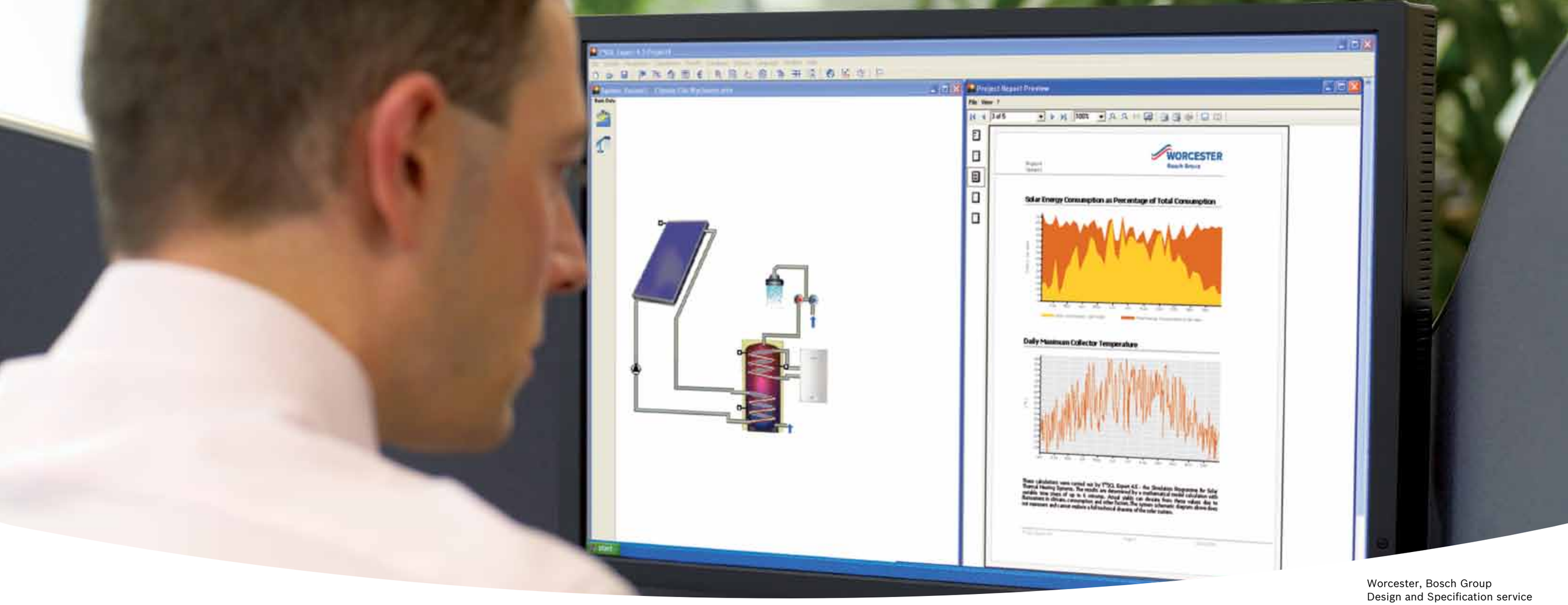

Worcester, Bosch Group
Design and Specification service

Worcester and you. Making a difference.

Working together for many years, heating professionals and Worcester have been making a real difference in hundreds of thousands of homes across the UK. We are recognised as a market leader in high efficiency, condensing boiler technology and are also committed to providing renewable energy solutions.

As part of the Bosch Group, our products are designed and manufactured to provide the high levels of quality and reliability which are synonymous with the Bosch name throughout the world.

We're a leading British company, employing approximately 2,000 people at our headquarters and manufacturing plants in Worcester and at Clay Cross in Derbyshire, including a nationwide network of over 300 Service Engineers and over 80 technically-trained Field Sales Managers.

As part of Europe's largest supplier of heating products, Worcester, Bosch Group has the UK-based resources and support capability to offer you the value-added solutions we feel you deserve.

"At Worcester, we remain keen to embrace new market opportunities where possible as we move towards the wider installation of renewable technologies in UK homes. In doing so, we will continue to deliver on our core values of reliability, quality, efficiency and value for money to ensure you have all you require in order to deliver only the best solutions to your customers' requirements."

Carl Arntzen,
Managing Director,
Bosch Thermotechnology Ltd.

BOSCH
Invented for life

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Worcester Greenskies solar thermal panels

As part of the Bosch group, Worcester is committed to environmental protection. With product development being prioritised in the interests of people's safety, the economical use of resources and environmental sustainability.

With this in mind Worcester is proud to offer solar panels for hot water heating which allow the consumer to take advantage of renewable and sustainable energy.

Worcester Greenskies solar panels harness the power in both direct and diffused sunlight and convert the energy to heat for the production of hot water for the home.

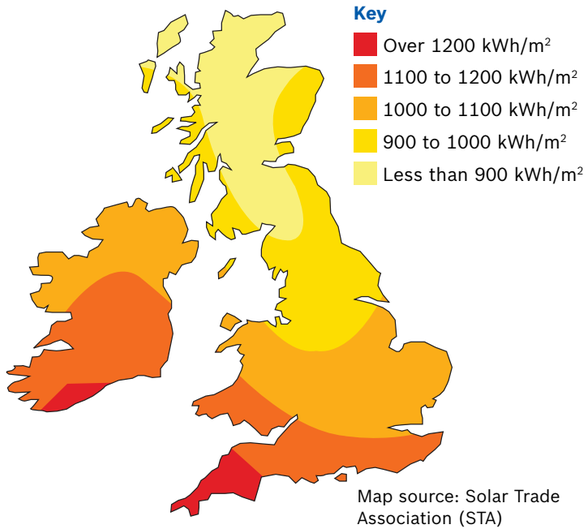
The solar panels have been designed as a complement to existing heating systems which use a store of hot water in a cylinder. The existing cylinder is exchanged for a cylinder with two heat exchanger coils; one from the boiler in the property and a second from the solar panels.

The Worcester Greenskies solar panels are a perfect partner to the range of condensing Greenstar regular and system boilers. There are different models available in both gas and oil, which require a separate cylinder for the storage of hot water.

When used together, a Greenstar gas or oil-fired boiler and solar thermal system provide a highly efficient means to give heating and hot water comfort.

A typical well sized solar thermal system should provide around 50-70% of the domestic hot water requirements of the home, representing a worthwhile saving on hot water heating costs. The remaining hot water requirement is provided by the boiler.

About solar in the UK



Map source: Solar Trade Association (STA)

A common question (see the FAQs section for more) about solar in the UK focuses on whether there is enough sunshine available to make solar worthwhile. The usual idea of British weather is of cloudy skies and intermittent sunshine. Contrary to popular belief the amount of solar radiation received by the UK is enough for solar water heating to be a viable supplement to existing domestic water heating.

How do solar water heating systems work?

Solar water heating systems use solar panels (called collectors) to collect heat from the sun which is then used to heat up the water stored in a hot water cylinder. A boiler is then used to further back up the heat from the water to reach the temperature you want.

Worcester Greenskies solar panels form part of a system which remains separate from the boiler heating system.

The panels are mounted on a surface which is selected for its exposure to sunlight and usually connected, via pipe work, to the lower coil of a twin-coil solar cylinder.

Perhaps surprisingly the UK receives 65% of the amount of solar radiation that is received by the south of Spain. The radiation in the UK is made up of direct radiation on sunny days, which accounts for around 40%, and diffused radiation on cloudy days, accounting for 60% of the total.

Worcester's solar panels have been developed with this typical weather in mind and make the most of both direct and diffused sunlight to give a useful annual contribution wherever you are in the UK.

Summer will provide the largest amount of radiation over the year but a useful contribution will be provided by other seasons. As an indication, a well sized typical installation will provide the following proportion of the household domestic hot water requirement:

% of requirement fulfilled by solar	
Season	**%**
Summer	80 - 90%
Spring & Autumn	40 - 50%
Winter	20 - 30%

This translates to over half of the typical annual domestic hot water requirement.

Position panels in a southerly direction for maximum potential.

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Types of solar thermal technology

There are three types of Greenskies solar thermal panels:

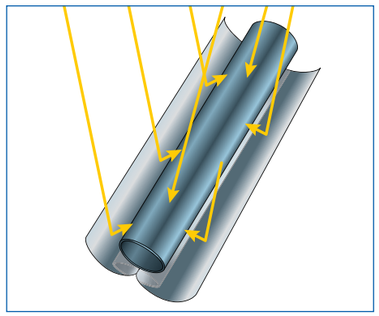
- Greenskies Solar-Lux evacuated tubes
- Greenskies Solar-Lifestyle flat plate collectors
- Greenskies Solar-Lito flat plate collectors.

The purpose of the solar thermal panels is for the energy in the sun's rays to be absorbed by the panel and the heat is transferred into the pipe work via the absorber plates. The pipe work is filled with a ready-mixed liquid, containing glycol and water, which is circulated by a pump to the coil in the hot water cylinder. The heat is deposited in the storage cylinder and the glycol returns to the panel to absorb more free solar energy.

The system is equipped with a simple unit to control the flow of energy from the panels to the storage cylinder.

Evacuated tubes: Solar-Lux

Worcester Greenskies Solar-Lux are double walled glass, direct flow, CPC mirror evacuated tubes. This means that the glycol flows directly through a U-shaped pipe inside a glass tube.



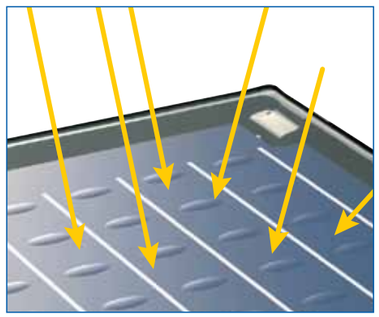
This acts like a thermos flask in trapping the solar radiation and has the added benefit of not allowing the heat it has gained to be lost easily.

The CPC mirror is a concave mirror set behind the tubes and leads direct and diffused radiation to the absorber even with adverse/acute angles – in effect, providing 360° absorption to the tube.

As such, evacuated tubes are a better choice where conditions and temperatures are not optimal – for example, for areas with lower average temperatures in the UK.

Flat plates: Solar-Lifestyle & Solar-Lito

Worcester Greenskies Solar-Lifestyle panels utilise a PVD Aluminium full sheet absorber plate which is ultrasonically welded to a harp absorber copper pipe to collect the solar radiation.



Worcester Greenskies Solar-Lito and Solar-Lito Mini collectors feature a copper strip absorber which has a high selective black chrome coating. It also utilises a copper pipe harp absorber as the hydraulic flow.

Introduction to the Greenskies solar thermal family

Greenskies Solar-Lux

The Solar-Lux evacuated tube panel series is the Worcester Greenskies offering for solar hot water luxury. Designed to complement the existing Worcester Greenskies solar flat panel range, the Solar-Lux 6 and 12 tube panels represent an optimum investment in hot water comfort per square metre of panel.

Worcester Greenskies Solar-Lux panels take full advantage of 360º absorption due to their Compound Parabolic Concentrator (CPC) mirror technology. This, combined with the Solar-Lux double glass vacuum tubes, mean that the panels not only provide a high output, but also high efficiency, even when conditions are not optimal.

Greenskies Solar-Lifestyle

The name as it suggests, stands for a product which fits in with all of the lifestyle requirements of the homeowner and specifier. The Solar-Lifestyle panel boasts an award-winning design and is a modern, visually stunning one-piece panel.

This panel is versatile and can go both in roof and on roof as well as a flat roof or façade It is also available in portrait and landscape format. It provides a high level of efficiency and is the optimum choice for all lifestyle requirements.

The Greenskies Solar-Lifestyle panels feature a whole range of Installer's Choice Design (ICD) accessories which make installation easier. These include a green indicator button on the centre rail connection pieces for installation support and angled side brackets for easier insertion of tools.

Greenskies Solar-Lito

Lito is Latin meaning for comfort or to offer solace. The Lito range of panels offer the homeowner affordable solar hot water comfort and also flexible solutions for the installer. Both 1 sq.m (Solar-Lito Mini) and 2 sq.m. options can be combined to combat awkward roof spaces and shapes while also being more accurately sized to 150 litre and 250 litre cylinders.

The Greenskies Solar-Lito panels feature an aluminium frame which gives a different aesthetic appeal to the consumer. It also makes the collector more light weight and the 2m² Lito panel is a class leading 30kg, whilst the Lito Mini is a one man lift at 18kg.

Not only do the panels provide installation flexibility, but the name is flexible too. 'L' shapes, 'i' shapes, 'T' shapes and 'O' shapes made possible with the panel combinations also give the name 'Lito' further meaning.

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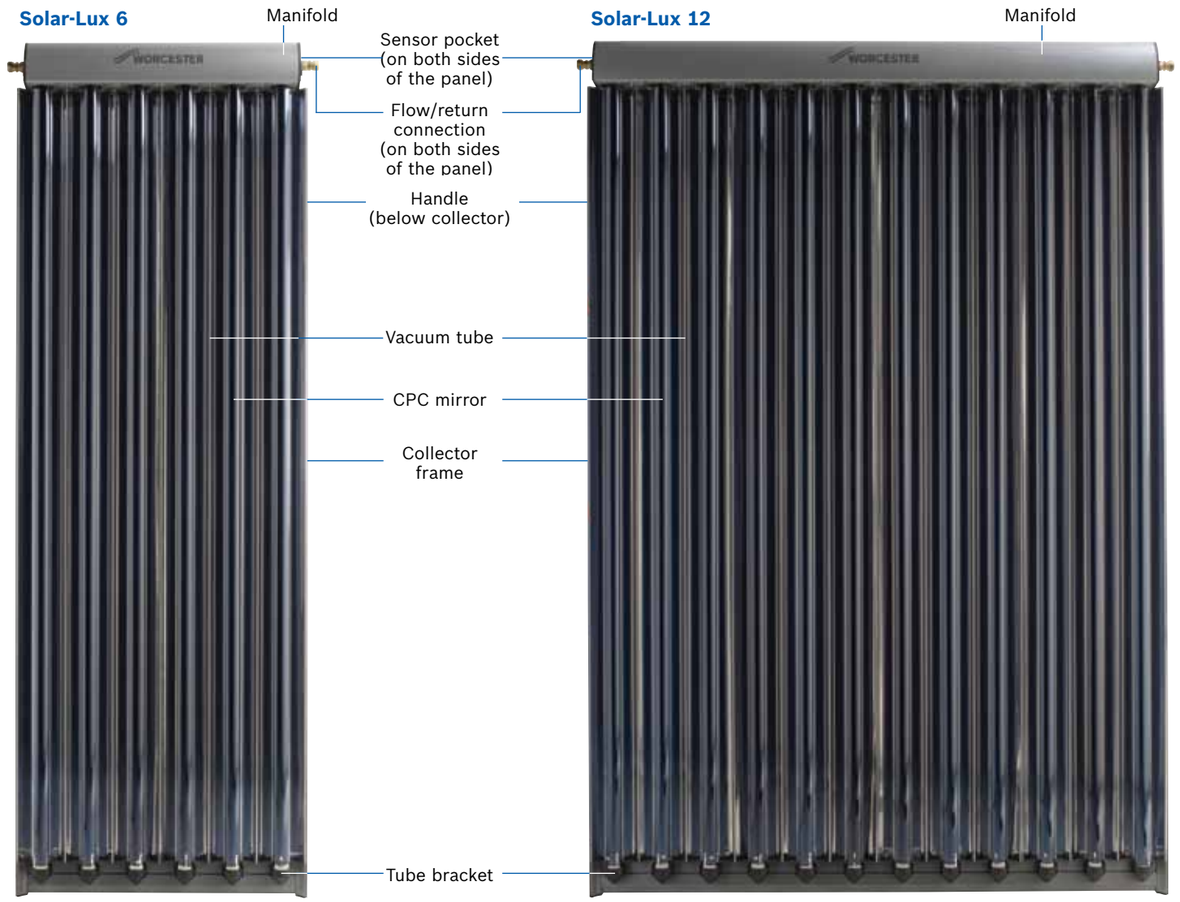
Greenskies solar thermal panels at a glance

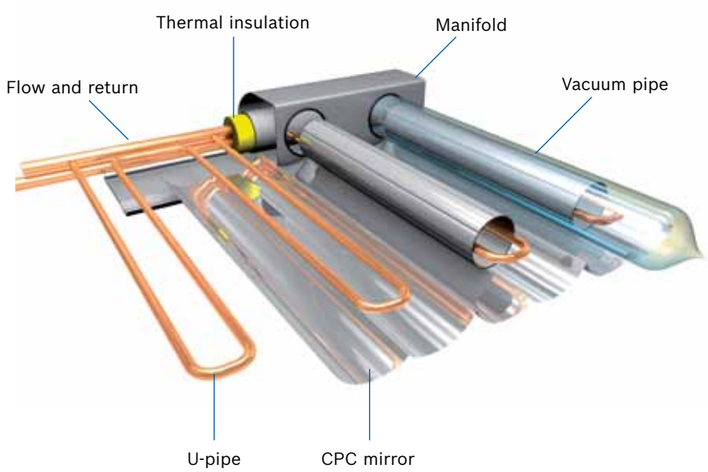
Panel type	Solar-Lux 6	Solar-Lux 12	Solar-Lifestyle	Solar-Lifestyle	Solar-Lito	Solar-Lito Mini
Orientation	6 Tube	12 Tube	Portrait	Landscape	Portrait	Portrait
Dimensions	2057 x 702 x 101mm	2057 x 1392 x 101mm	1175 x 2017 x 87mm	2017 x 1175 x 87mm	1032 x 2026 x 67mm	1032 x 1032 x 67mm
Gross collector area	1.44m²	2.86m²	2.37m²	2.37m²	2.09m²	1.06m²
Aperture area	1.28m²	2.57m²	2.25m²	2.25m²	1.94m²	0.96m²
Absorber area	1.06m²	2.14m²	2.18m²	2.18m²	1.92m²	0.87m²
Absorber volume	0.97 litres	2.12 litres	0.94 litres	1.35 litres	0.8 litres	0.62 litres
Weight empty	24kg	43kg	40kg	41kg	30kg	18kg
Coating Absorption Emission	N/A	N/A	High selective (PVD) 95 ± 2% 5 ± 2%		Black chrome 95 ± 2% 10 ± 2%	
η0	64%	64%	79%	77%	76%	74%
a1 a2	0.749 W/m²k 0.005 W/m²k²	0.749 W/m²k 0.005 W/m²k²	3.327 W/m²k 0.016 W/m²k²	3.327 W/m²k 0.016 W/m²k²	4.052 W/m²k 0.0138 W/m²k²	4.424 W/m²k 0.013 W/m²k²
1,000 W/m² ΔT = 0K ΔT = 30K ΔT = 50K	824 W/m² 790 W/m² 760 W/m²	1,655 W/m² 1,586 W/m² 1,527 W/m²	1,725 W/m² 1,478 W/m² 1,279 W/m²	1,735 W/m² 1,450 W/m² 1,233 W/m²	1,470 W/m² 1,209 W/m² 1,009 W/m²	698 W/m² 563 W/m² 460 W/m²
Stagnation temperature tstg.	301ºC	301ºC	199.3ºC	199.3ºC	164ºC	164ºC
Max. operation pressure pmax	10 bar	10 bar	6 bar	6 bar	6 bar	6 bar
Nominal flow rate [l/h]	166 litres/hour	166 litres/hour	50 litres/hour	50 litres/hour	50 litres/hour	47 litres/hour

W = power (instant power)

Greenskies Solar-Lux inside story



Greenskies Solar-Lux panels close up



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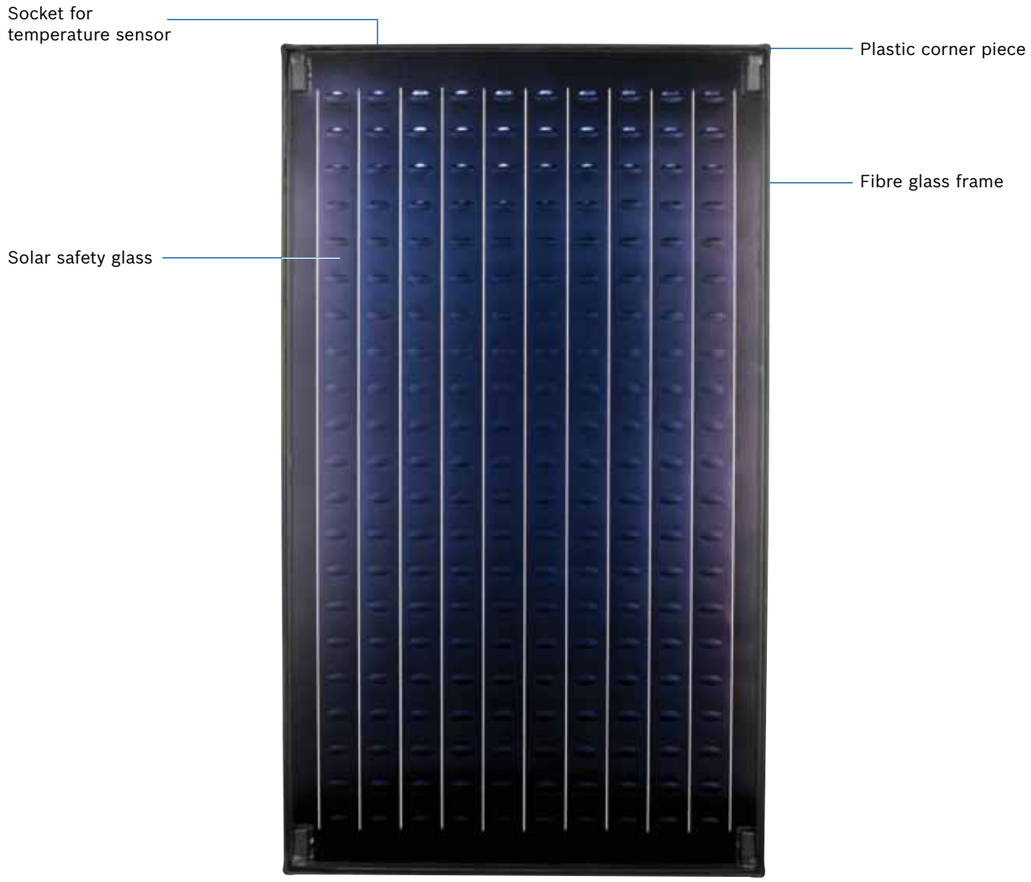
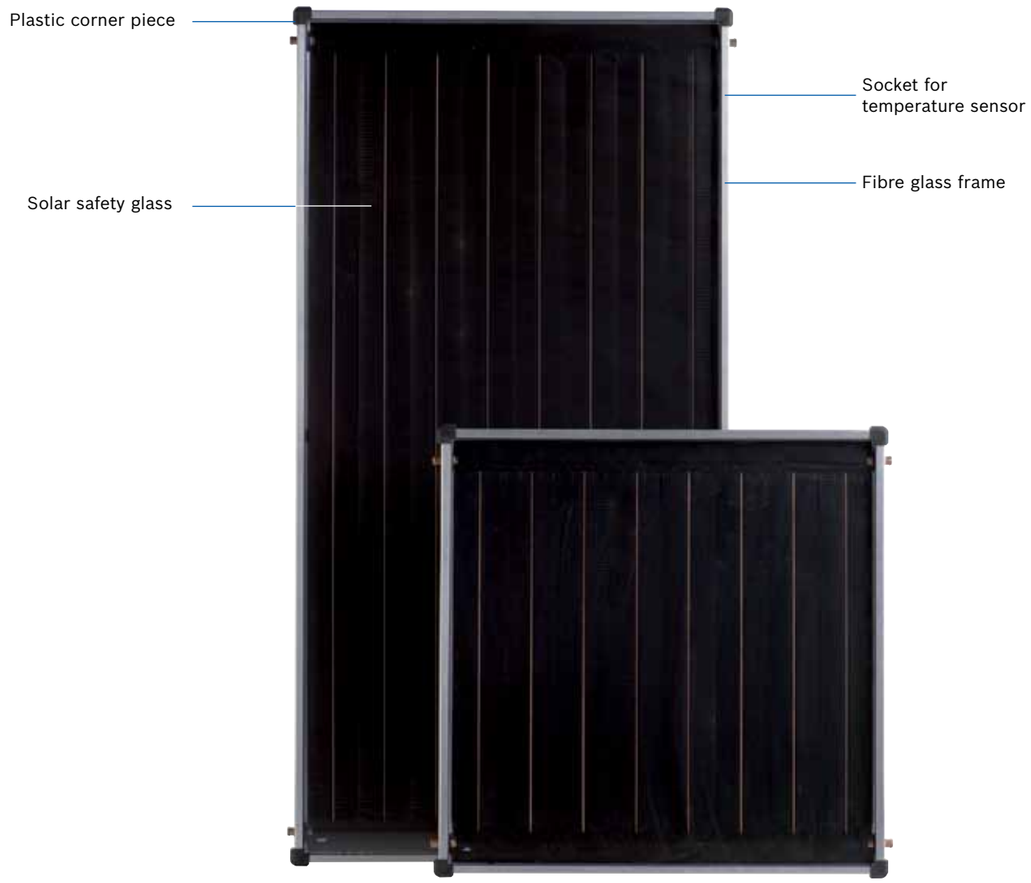
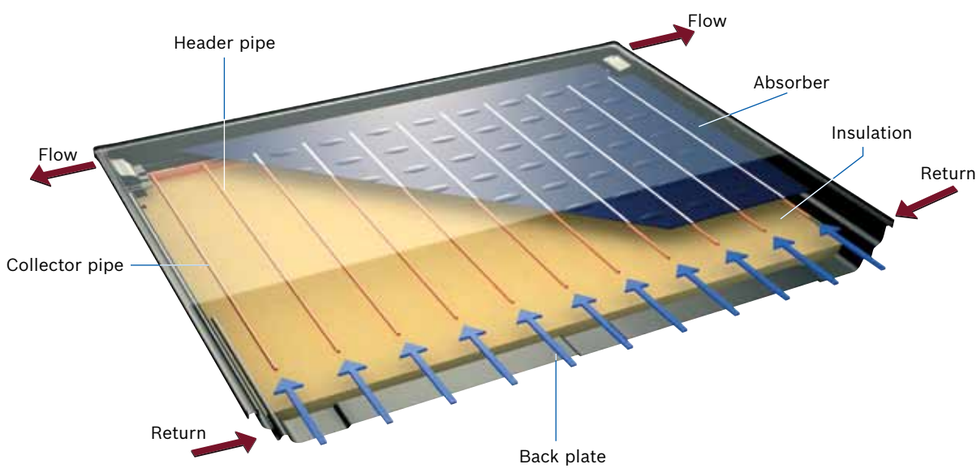
Greenskies Solar-Lifestyle inside story



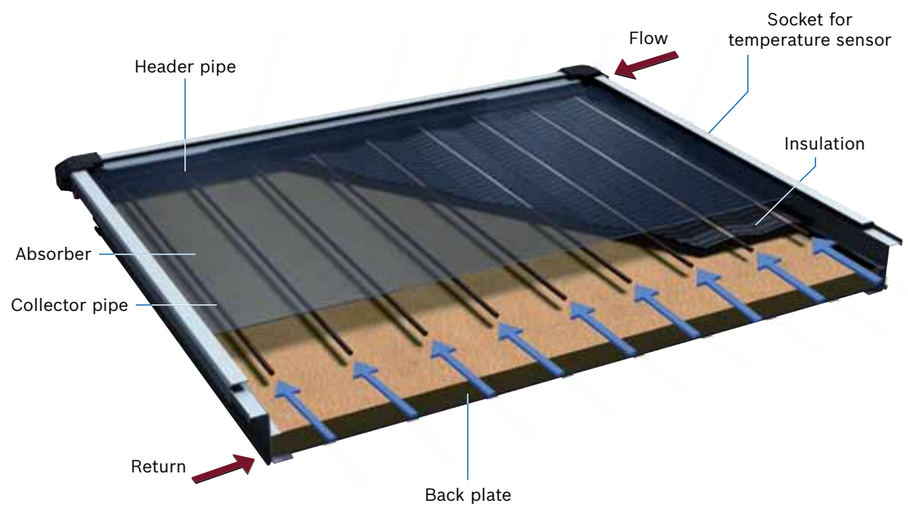
Greenskies Solar-Lito inside story



Greenskies Solar-Lifestyle panel close up



Greenskies Solar-Lito panel close up



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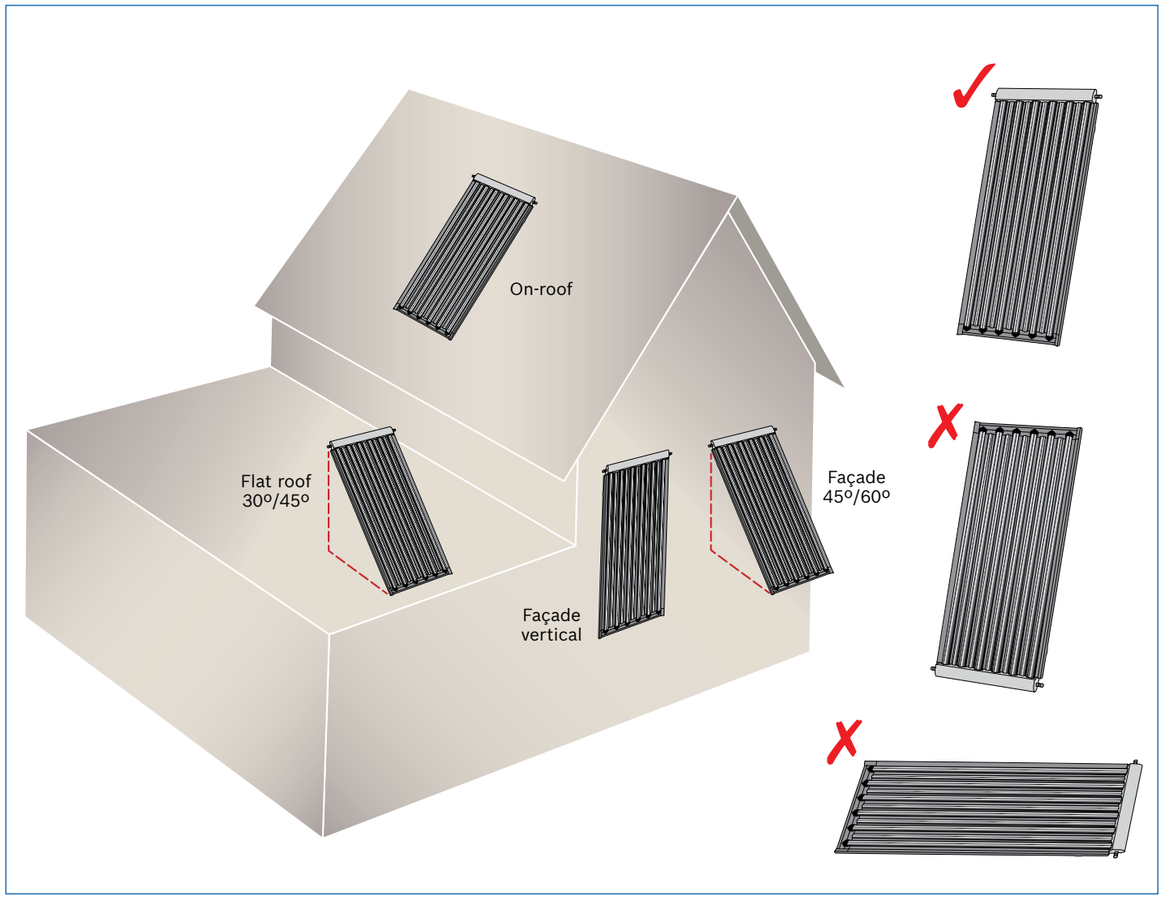
Application of Greenskies solar thermal panels

Worcester offers a range of options for a solar water heating solution as an addition to an existing or replacement boiler. The solar panels can also be used for other water heating requirements such as heating of swimming pools. See the controls section (page 30) for details of the TDS300 controller which makes advanced system configurations (including East/West Split) possible.

The panels can be mounted directly onto sloping roofs with a variety of fixings for different roof coverings or onto a frame for flat roofs. In addition, in-roof flashings and wall mounting brackets are available. The solar panels should be installed in a southerly direction at an angle of between 30º and 45º. Where this is not possible the installation should move towards a westerly facing direction. East and North facing directions should ideally be avoided, though an East/West split is permissible.

Summary of applications

Greenskies Solar-Lux installation options



Collectors can only be installed vertically with the manifold at the top.

Greenskies Solar-Lifestyle installation options

Solar-Lifestyle on-roof installation

Solar-Lifestyle in-roof installation

Solar-Lifestyle flat roof installation

Solar-Lifestyle façade installation

The same options are also available for Greenskies Solar-Lifestyle landscape collectors.

Greenskies Solar-Lito installation options

Solar-Lito

Solar-Lito on-roof installation

Solar-Lito Mini

Solar-Lito Mini on-roof installation

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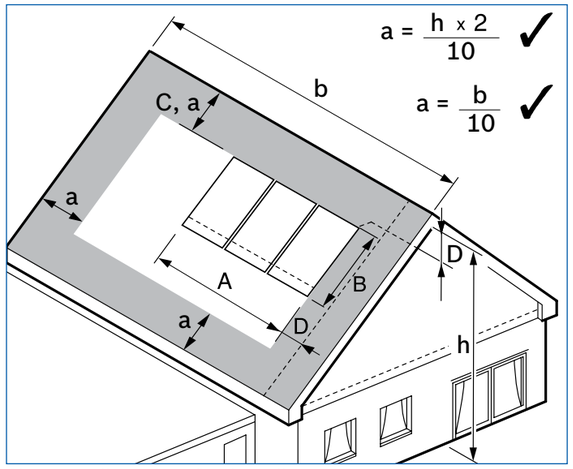
Greenskies Solar-Lux installation guide

Greenskies Solar-Lux standard flat roof installation

Panel dimensions and clearances



Clearance dimensions for the collector array

Dimension a
Use a formula, both are possible.

Dimensions A and B
(See table below).

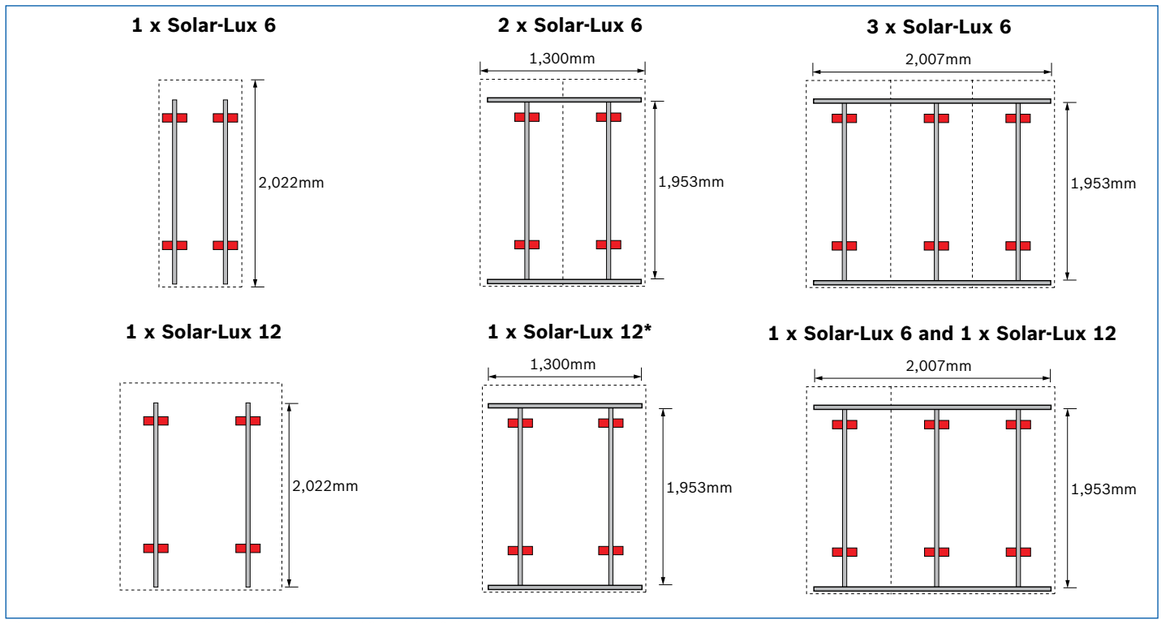
Dimension C
At least 3 rows of tiles to ridge or chimney (or at least 0.5m if 3 rows of tiles are smaller than this distance).

Dimension D
At least 0.5m to the right and left of the collector array as well as to the ridge for connection lines below the roof.

	Solar-Lux 6		Solar-Lux 12	
Number of collectors*	Dimension A	Dimension B	Dimension A	Dimension B
1	0.70m	2.06m	1.40m	2.06m
2	1.40m	4.27m	2.80m	4.27m
3	2.10m	6.48m	4.20m	6.48m
4	2.80m	–	5.60m	–
5	3.50m	–	7.00m	–
6	4.20m	–	8.40m	–

Space requirements (for dimension B)*

Examples of how the rails can be used



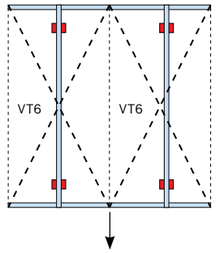
**Recommended for the combination 2 x Solar-Lux 12 and 1 x Solar-Lux 6*

Mounting set combinations – on-roof

On-roof set 2 VT6

Maximum loads:

- Snow: 2.0kN/m²
- Wind: 129km/h



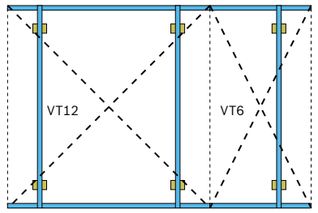
Extendable with:
On-roof set 2 VT6
On-roof set 3 VT6
On-roof set VT6/VT12

Key
On-roof set 2 VT6
Roof connection, 4 pcs VT

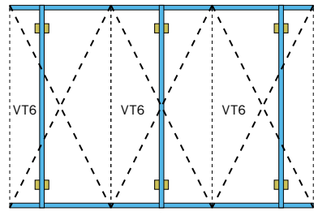
On-roof set 3 VT6

Maximum loads:

- Snow: 1.5kN/m²
- Wind: 129km/h



or



Extendable with:
On-roof set 2 VT6
On-roof set 3 VT6
On-roof set VT6/VT12

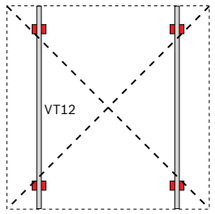
Key
On-roof set 3 VT6
Roof connection, 6 pcs VT

On-roof set 2 VT6/VT12

Maximum loads:

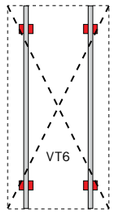
- Snow: 2.0kN/m²
- Wind: 129km/h

Single VT12



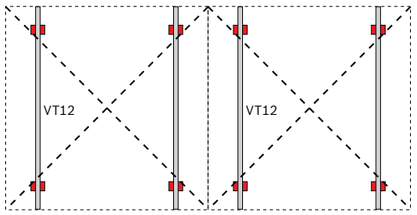
or

Single VT6



or

Row of VT12 or VT6



Key
On-roof set VT6 / VT12
Roof connection, 4 pcs VT

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Greenskies Solar-Lux standard flat roof installation

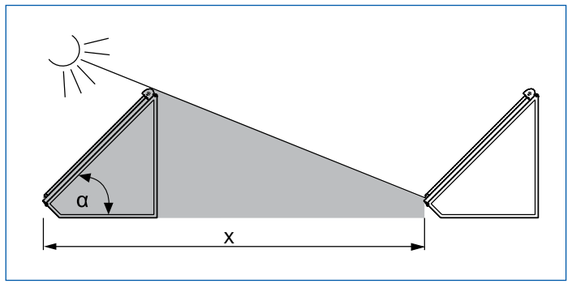
Angle of incidence

The collectors' angle of incidence depends on the required area of application. Select the correct angle of incidence to safeguard the optimum annual yield.

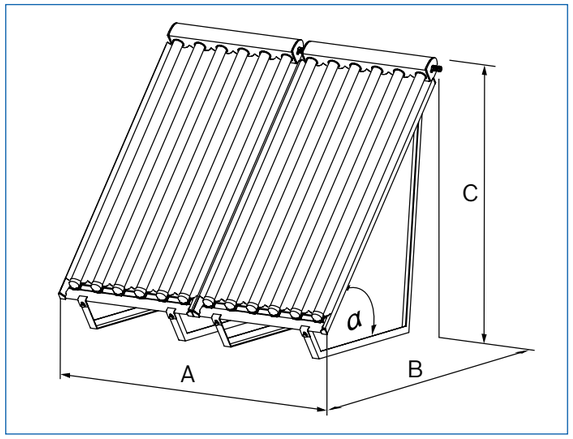
Application area	Angle of incidence ∝
Domestic hot water (DHW)	30º, 45º
DHW + central heating backup	45º, 60º
DHW + swimming pool	30º, 45º
DHW central heating backup + swimming pool	45º, 60º

The minimum clearance between the collector rows on a flat roof is determined by the angle of incidence of the collector.

The distance between arrays (dimension x.) must be large enough to avoid shadows falling on adjacent collectors.



Dimensions



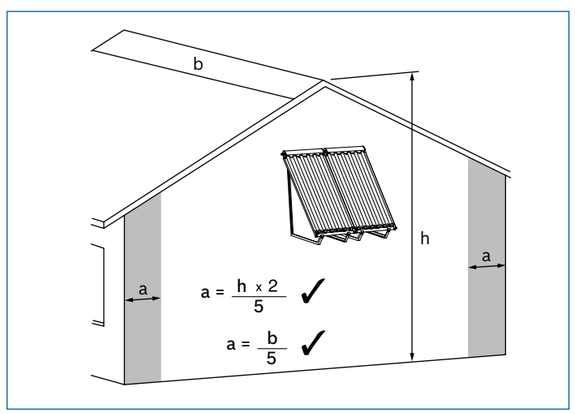
Collector array site

Number of collectors	Dimension A Solar-Lux 6	Dimension A Solar-Lux 12
1	0.70m	1.40m
2	1.40m	2.80m
3	2.10m	4.20m
4	2.80m	-
5	3.50m	-
6	4.20m	-

Angle of incidence ∝	Dimension B	Dimension C
30º	1.85m	1.22m
45º	1.49m	1.49m
60º	1.22m	1.85m
90º[1]	–	2.06m

[1] *Installation with mounting brackets in place of angle section frames.*

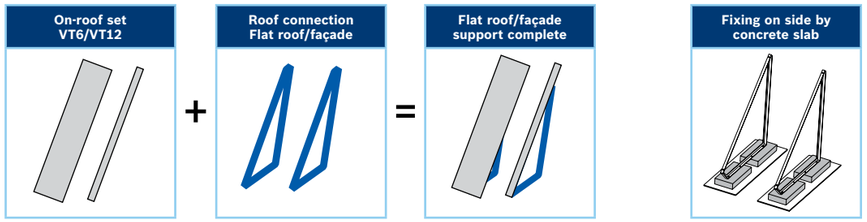
Wall installation



Minimum clearance towards the lateral edge (dimension a) when installing collectors on walls; both formulae can be applied.

Mounting set combinations – flat roof

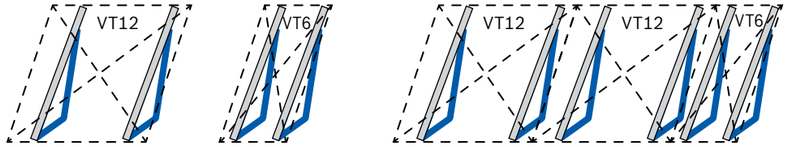
Flat-roof installation 45°/30° / façade 45°/60°.



Flat roof

Maximum loads:

- Snow: 2kN/m²
- Wind: 129km/h



Single VT12 **Single VT6** **Row of VT12 or VT6**

Key

- On-roof set VT6/VT12
- Roof connection flat roof/façade VT

Greenskies Solar-Lux: other installation considerations

Sizing

As a general rule, 6 Greenskies Solar-Lux tubes should be enough for 100 litres of hot water, although collectors should be sized for the hot water demand of each property accordingly. Suitable sizing software should be used where appropriate. More information can be found on the Worcester website at **www.worcester-bosch.co.uk.**

Tank volume (l)	No. of tubes SL6/SL12
100	6
200	12
300	18

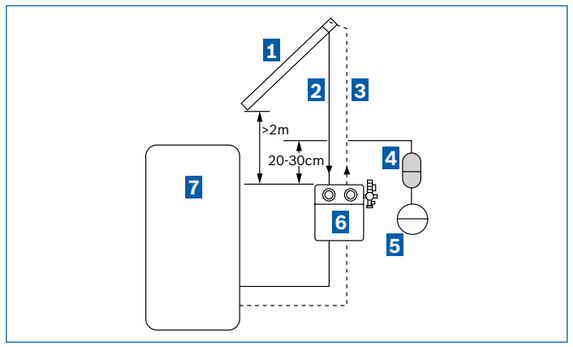
Commissioning

When commissioning a Solar-Lux 6 or 12 tube system, an electrical filling pump must be used to fill and vent the system.

A TDS100 or TDS300 controller **must** be used with an evacuated tube system and evacuated tube mode should be selected within the controller when commissioning.

Important installation notes

Greenskies Solar-Lux evacuated tubes should be installed with a minimum pipe length of 5 metres flow and 5 metres return pipe work between the collector and the pump station. It is also recommended to fit a pre-cooling vessel to protect the expansion vessel from the high temperatures involved.



Key	Part
1	Evacuated tube collector
2	Flow pipe – minimum length of 5m
3	Return pipe – minimum length of 5m
4	Pre-cooling vessel – always necessary for systems with heating support or solar fraction >60% necessary to protect the expansion vessel from steam due to stagnation.
5	Expansion vessel – connection 20-30cm above solar pump station to protect safety devices and insulation from overheating due to steam during stagnation.
6	Solar pump station
7	Storage tank

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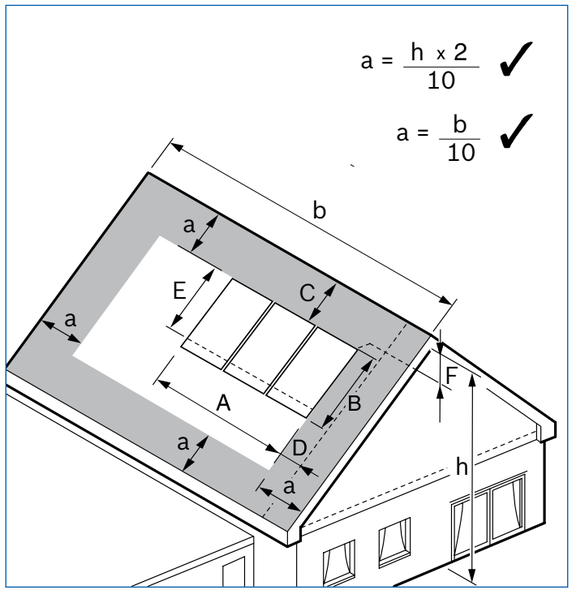
Greenskies Solar-Lifestyle installation guide

Greenskies Solar-Lifestyle standard on-roof installation

Panel dimensions and clearances

Please observe the following minimum space requirements.



Dimension a
Either formula can be used. The lower value can be applied.

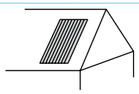
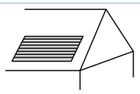
Dimensions A and B
(See table below).

Dimension C
At least 2 rows of tiles to ridge or chimney (or at least 0.5m if 3 rows of tiles are smaller than this distance).

Dimension D
At least 0.5m for the flow on the right or left of the collector array.

Dimension E
Equals 1.8m (horizontal version: 1.0m) and is the minimum clearance from the upper edge of the collector to the lower profile rail, which is installed first.

Dimension F
If an air vent valve is required in the roof, at least 0.4m for the flow.

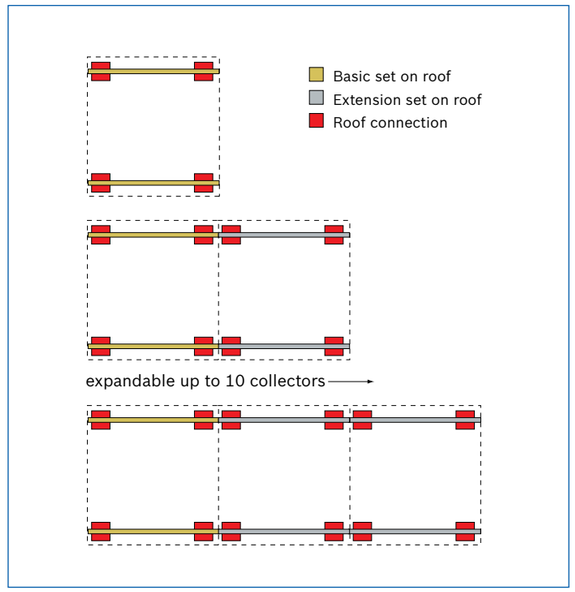
				
Number of collectors*	**Dimension A**	**Dimension B**	**Dimension A**	**Dimension B**
1	1.18m	2.02m	2.02m	1.18m
2	2.38m	2.02m	4.06m	1.18m
3	3.58m	2.02m	6.11m	1.18m
4	4.78m	2.02m	8.15m	1.18m
5	5.98m	2.02m	10.19m	1.18m
6	7.18m	2.02m	12.23m	1.18m
7	8.38m	2.02m	14.27m	1.18m
8	9.58m	2.02m	16.32m	1.18m
9	10.78m	2.02m	18.36m	1.18m
10	11.98m	2.02m	20.40m	1.18m

Space required for vertical and horizontal versions

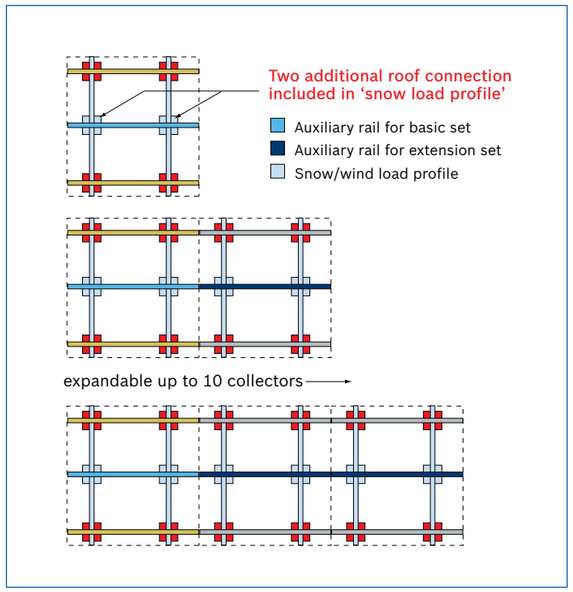
Greenskies Solar-Lifestyle on-roof installation assembly

Portrait collectors

- Wind loads: up to 1.1kN/m² (~151km/h)
- Snow loads: up to 2.0kN/m²

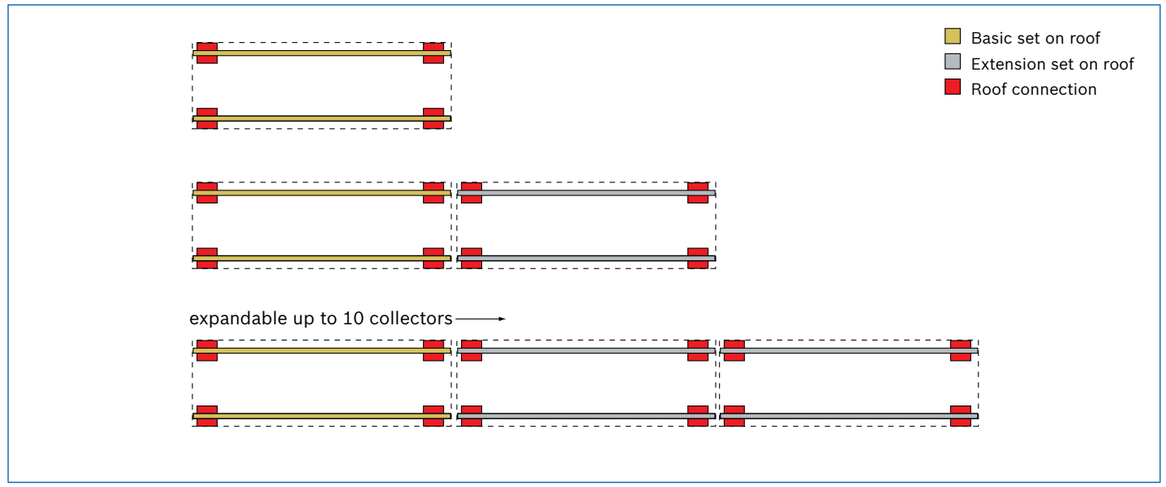


- Wind loads: > 1.1kN/m² (~151km/h)
- Snow loads: > 2kN/m² - 3.1kN/m²



Landscape collectors

- Wind loads: up to 1.1kN/m² (~151km/h)
- Snow loads: 2.0kN/m²
- Lath distance < 420mm



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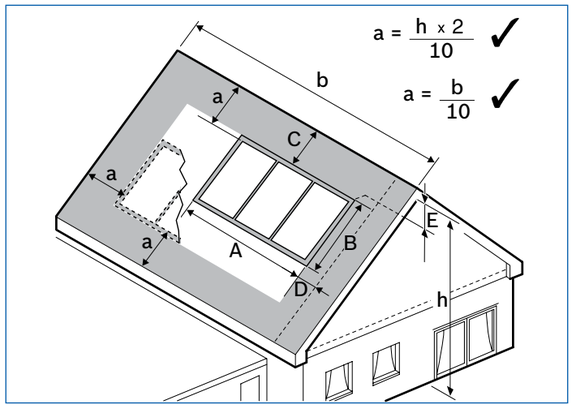
Greenskies Solar-Lifestyle in-roof installation



Dimension A (including flashing panels)				
Number of collectors	Roof tile/slate		Raised tile	
	Portrait	Landscape	Portrait	Landscape
1	1.54m	2.38m	1.61m	2.45m
2	2.74m	4.42m	2.81m	4.49m
3	3.94m	6.46m	4.01m	6.53m
4	5.14m	8.50m	5.21m	8.57m
5	6.34m	10.55m	6.41m	10.62m
6	7.54m	12.59m	7.61m	12.66m
7	8.74m	14.63m	8.81m	14.70m
8	9.94m	16.67m	10.01m	16.74m
9	11.14m	18.71m	11.21m	18.78m
10	12.34m	20.76m	12.41m	20.83m

Space required for vertical and horizontal versions

Dimension B (including flashing panels)						
Series	Roof tile		Raised tile		Slate	
	Portrait	Landscape	Portrait	Landscape	Portrait	Landscape
1, without lead flashing	2.59m	1.75m	2.86m	2.02m	2.62m	1.77m

Dimension a
Either formula can be used. The lower value can be applied.

Dimension A
Space requirement including panel (see table below).

Dimension B
Space requirement including panel (see table below).

Dimension C
At least 2 rows of tiles to ridge or chimney (or at least 0.5m if 3 rows of tiles are smaller than this distance).

Dimension D
At least 0.5m for the flow on the right or left of the collector array.

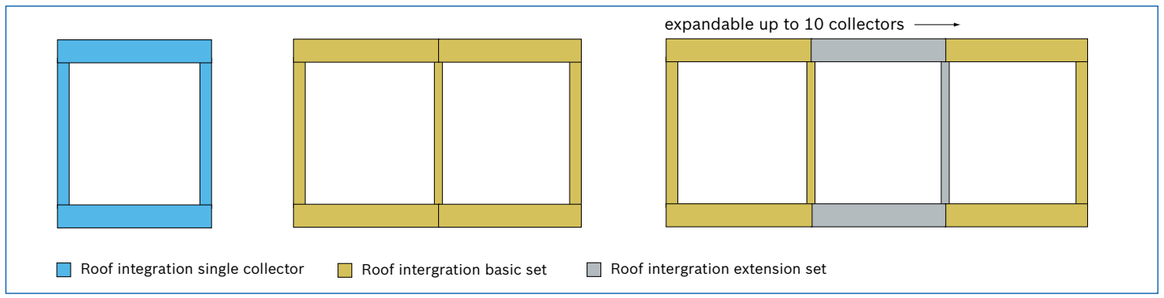
Dimension E
If an air vent valve is required in the roof, at least 0.4m for the flow.

Note: Allow for a clearance of at least 3 roof tiles between both collector arrays.

Greenskies Solar-Lifestyle in-roof installation assembly

Portrait/landscape collectors*

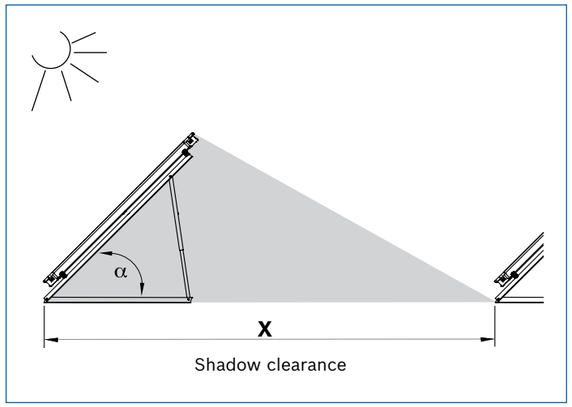
- For snow loads up to 3.8kN/m² and 1.1kN/m² (~151km/h) wind



Suitable for standard pan tile roofs only. When installing on other roof types please check the part list at the rear of this brochure for alternative parts.

Greenskies Solar-Lifestyle standard flat roof installation

Shadow clearance



Determining the clearance between rows of collectors		
Angle of incidence ∝	Clearance X – flat roof	
	Portrait	Landscape
30º	5.05m	2.94m
35º	5.44m	3.17m
40º	5.79m	3.37m
45º	6.09m	3.55m
50º	6.35m	3.70m
55º	6.56m	3.82m
60º	6.72m	3.92m

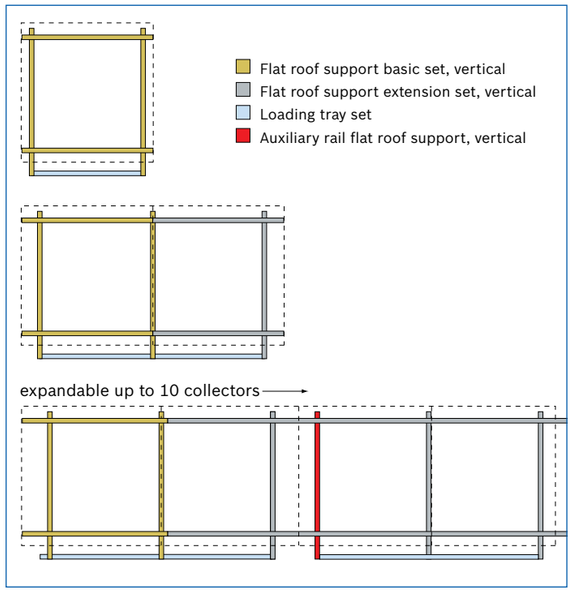
The minimum clearance X between the collectors results from the collectors' angle of incidence. Clearance between the rows of collectors at minimum solar altitude (on a flat roof: 17º; on a wall: 61º).

Greenskies Solar-Lifestyle flat roof installation assembly

Portrait

Flat support by loading tray set

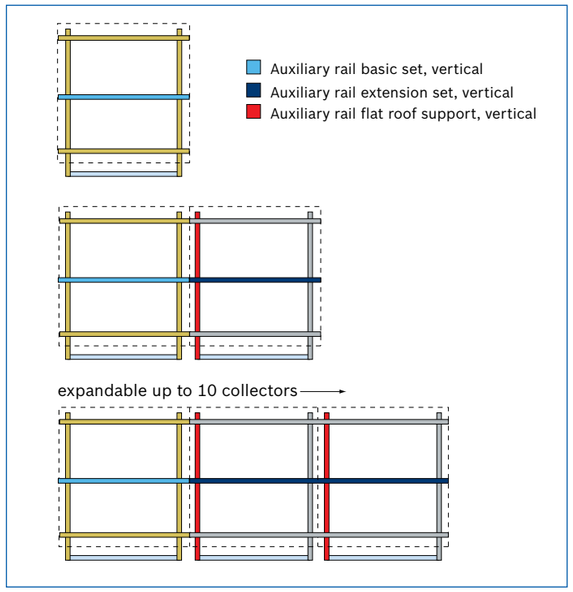
- Wind speed ≤151km/h
- Snow loads ≤2kN/m²



Landscape

Flat support by loading tray set

- Wind speed ≤151km/h
- Snow loads >2kN/m² - 3.8kN/m²



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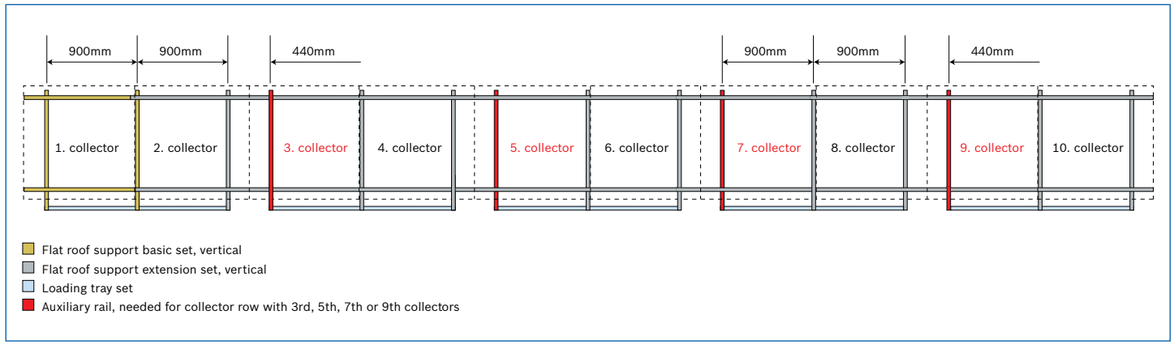
Greenskies Solar-Lifestyle flat roof installation

Using auxiliary rail for flat roof support fixed by loading tray set

Portrait

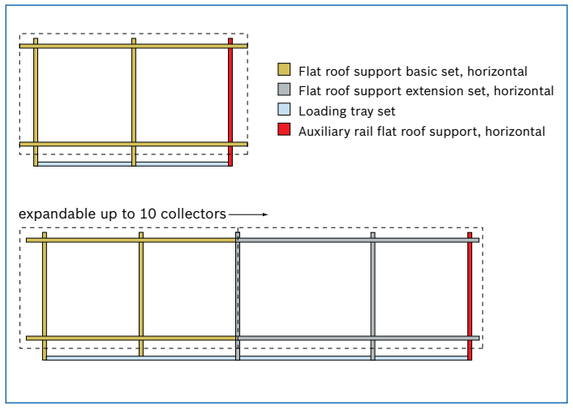
Operation

- Wind speed ≤151km/h
- Snow loads ≤2kN/m²



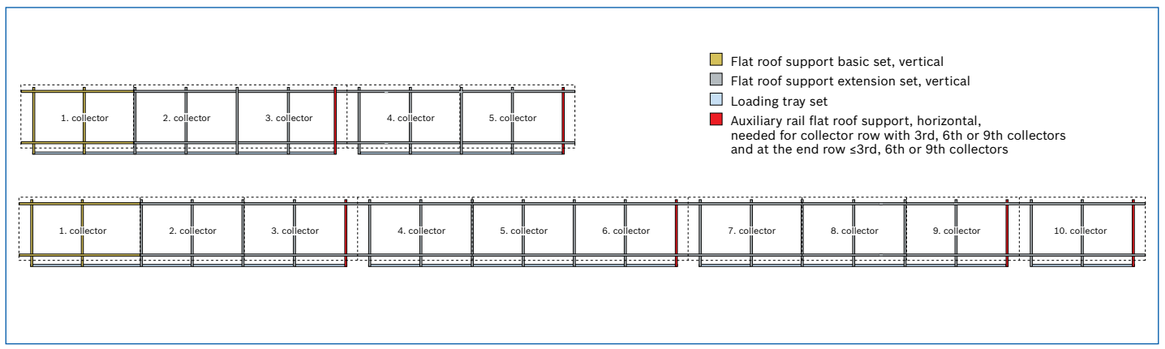
Landscape

- Wind speed ≤151km/h
- Snow loads ≤2kN/m² - 3.8kN/m²



Example of 5 and 10 collectors

- Wind speed ≤151km/h
- Snow loads ≤2kN/m²

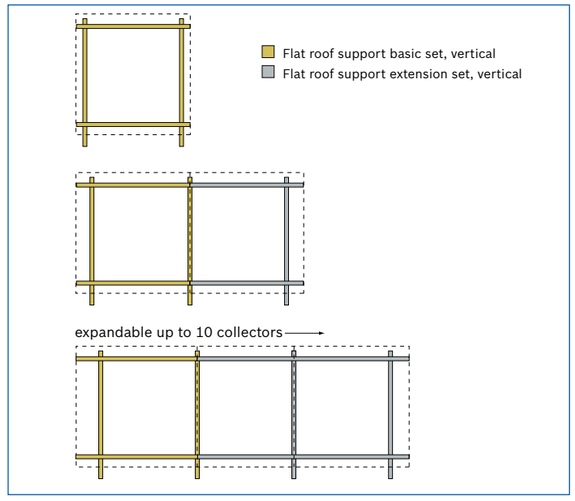


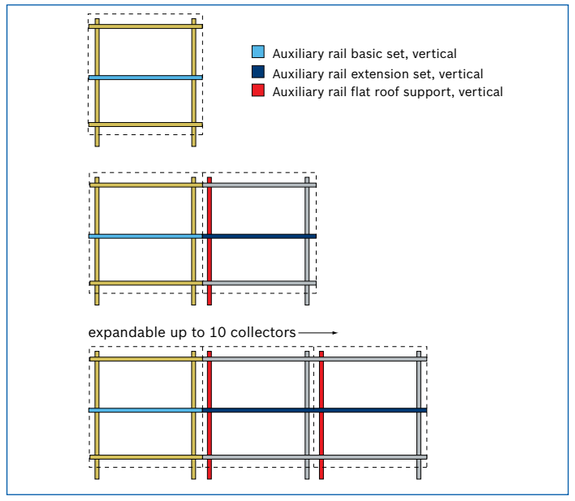
Greenskies Solar-Lifestyle flat roof installation

Using auxiliary rail for flat roof support fixed by conventional fixings

Portrait

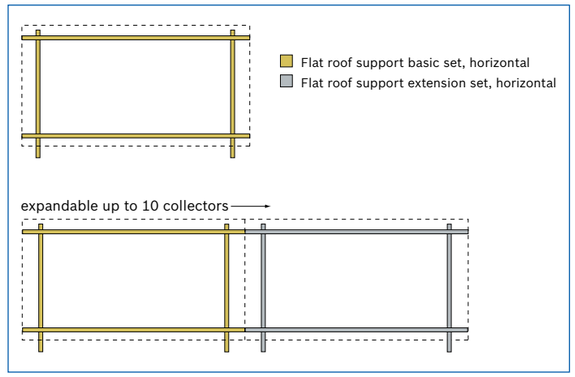
- Wind speed ≤151km/h
- Snow loads >2kN/m² - 3.8 kN/m²





Landscape

- Wind speed ≤151 km/h
- Snow loads ≤2kN/m² - 3.8kN/m²



Wind speed: fixing of flat roof supports

It is important to check the maximum possible load of the roof. The table below applies to both portrait and landscape.

Corresponding wind speed	Fixing by loads (loading tray set)	Fixing by loads and additional cable	Fixing by customer (on external support)
102km/h	278kg/collector	186 kg/collector + cable with 2.0kN maximum traction	4 x screw M8/8.8
129km/h	481kg/collector	329 kg/collector + cable with 3.0kN maximum traction	4 x screw M8/8.8
151km/h	695kg/collector	486 kg/collector + cable with 4.0kN maximum traction	6 x screw M8/8.8

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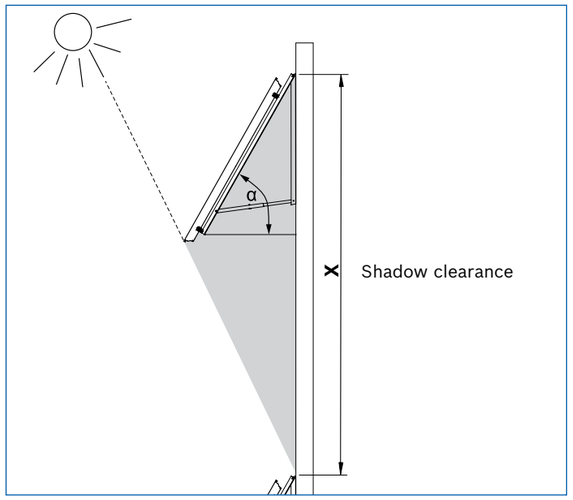
Greenskies Solar-Lifestyle façade installation

Shadow clearance

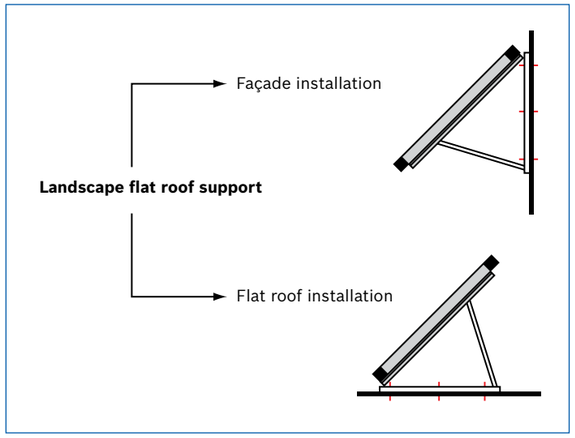


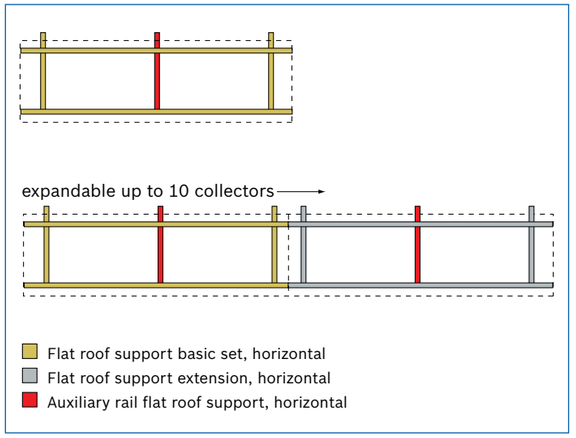
Determining the clearance between rows of collectors	
Angle of incidence ∝	Clearance X – wall Landscape
30º	–
35º	–
40º	–
45º	2.33m
50º	2.26m
55º	2.18m
60º	2.08m

The minimum clearance X between the collectors results from the collectors' angle of incidence. Clearance between the rows of collectors at minimum solar altitude on a wall is 61º.

Solar-Lifestyle wall mounted installation for landscape collector types

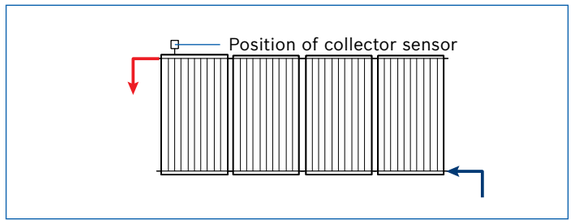
- Wind speed = 151km/h
- Snow loads = 2kN/m²





Solar-Lifestyle: hydraulic connections

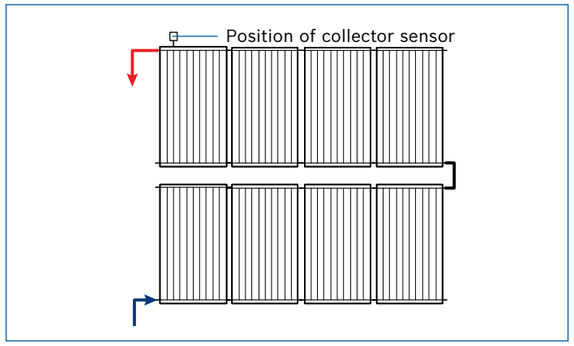
Solar-Lifestyle 1 collector row



- Left or right sided connection
- Permitted number of collectors: 1-10

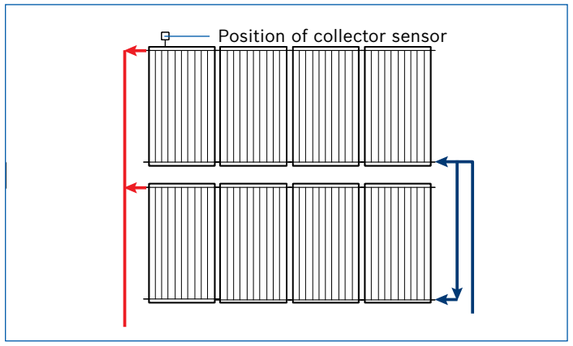
Solar-Lifestyle 2 collector row

Series connection



- Permitted number of collectors in each row: 1-5
- Different numbers of collectors between the rows possible

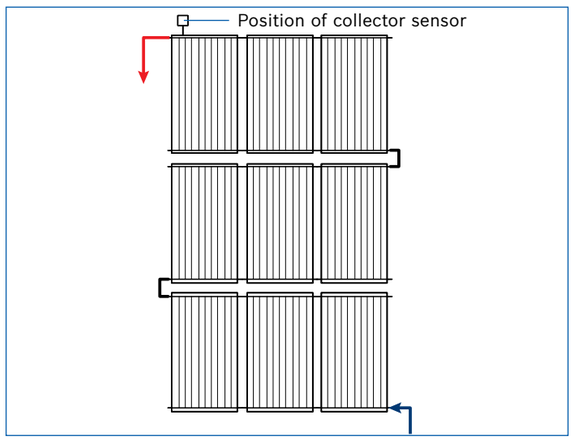
Parallel connection



- Permitted number of collectors in each row: 1-10
- Different numbers of collectors between the rows only by regulating of flow rates in each row

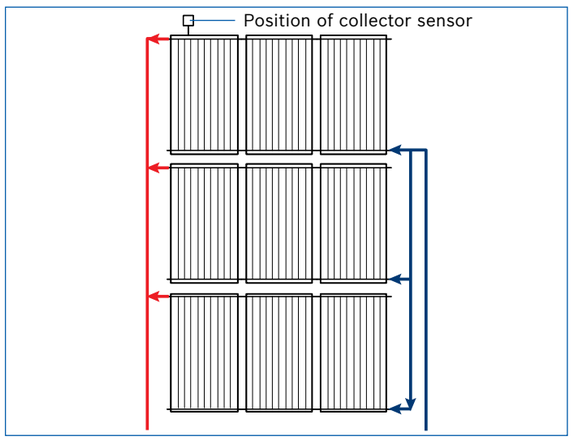
Solar-Lifestyle 3 collector row

Series connection



- Permitted number of collectors in each row: 1-3
- Different numbers of collectors between the rows possible

Parallel connection



- Permitted number of collectors in each row: 1-10
- Different numbers of collectors between the rows only by regulating of flow rates in each row

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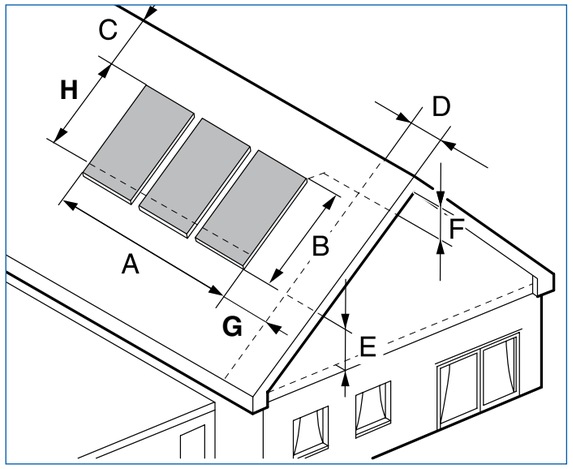
Greenskies Solar-Lito installation guide

Greenskies Solar-Lito standard on-roof installation

Panel dimensions and clearances



Required distance for vertical collectors

Number of collectors	Dimension A	Dimension B	
1	1,095m	1,032m(1)	2,026m(2)
2	2,196m		
3	3,296m		
4	4,397m		
5	5,497m		
6	6,598m		
7	7,698m		
8	8,799m		
9	9,899m		
10	11,000m		

Space requirements for vertical collectors
(1) Dimensions for Lito Mini collectors
(2) Dimensions for Lito collectors

Make sure that you have the following clearance space to install the equipment.

Dimensions A and B
Surface area required for collectors.

Dimension C
At least two free rows of tiles to the roof peak or chimney. Especially in the case of wet tiles, there is risk of damaging the roof*.

Dimension D
Prominence of the roof, including the thickness of the façade of the building.

Dimension E
At least 30cm should be cleared for the installation of the connection cables in the attic below.

Dimension F
At least 40cm for the installation of the connection cables in the attic, above (when installing the retainer, make sure that there is sufficient space in the water outlet area.

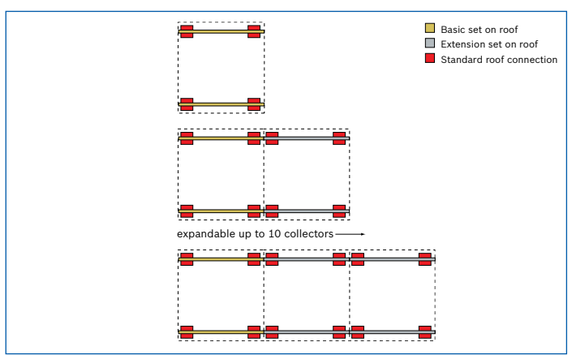
Dimension G
At least 50cm on the left and on the right of the collector array for the connection cables under the roof.

Dimension H
Dimension H corresponds to 1,900mm (2m² collectors) or 900mm (1m² collectors), and is the minimum distance from the upper corner of the collector until the middle of the lower rail, which is fixed first.

**Please note: No in-roof option is available on this range.*

Greenskies Solar-Lito and Lito Mini on-roof installation

Portrait collectors



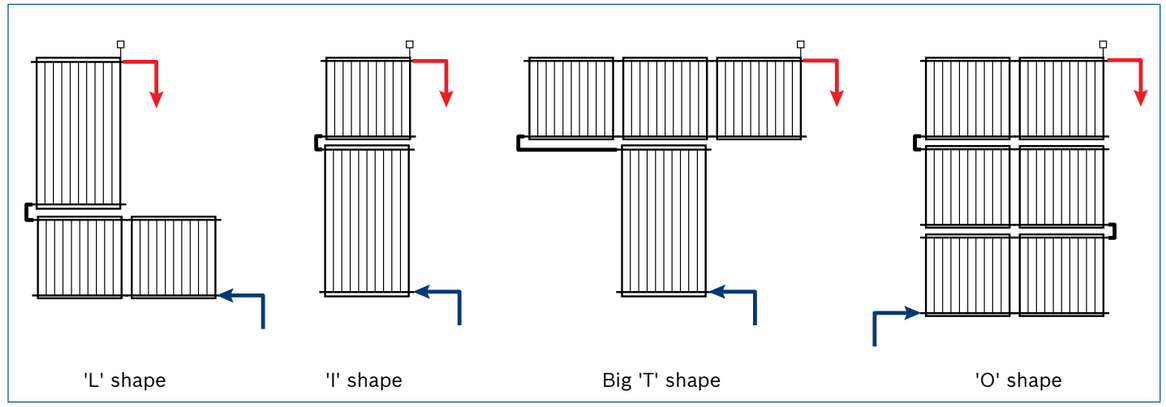
Greenskies Solar-Lito: hydraulic connections

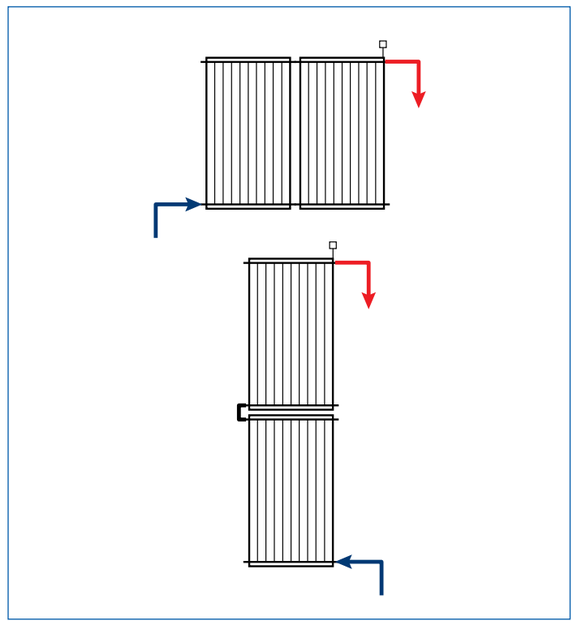
The Solar-Lito and Lito Mini panels can be combined together or installed separately in a range of flexible configurations to suit awkward roof shapes or even to more accurately size a solar output to the solar cylinder.

There are a few simple rules to observe when designing a Lito installation.

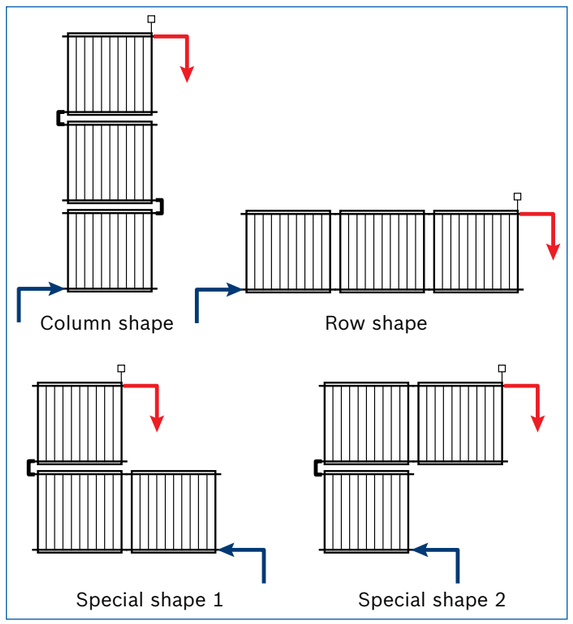
- The Solar-Lito and mini panels are always connected in series and not in parallel
- The sensor pocket on the Solar-Lito and the Solar-Lito Mini are both positioned on the top right hand side of the collectors. This means that any hydraulic configurations must be aligned so that the flow line is connected to the top right hand corner of the end panel in the configuration
- Any Lito or Lito Mini panels on the same row require one basic set on roof collector rails for the first panel, and then a basic extension set on roof for each subsequent panel on that same row
- When a Lito and Lito Mini are included on the same row, two separate basic set on roof collector rails are required because of the different heights involved.

Examples





Example Solar-Lito hydraulics schematics



Example Solar-Lito Mini hydraulics schematics

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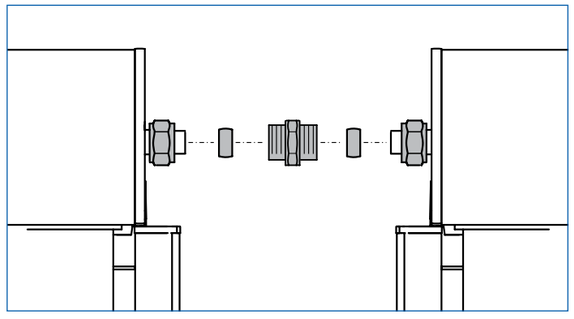
Greenskies panel pipework connections

Evacuated tube connections – Solar-Lux

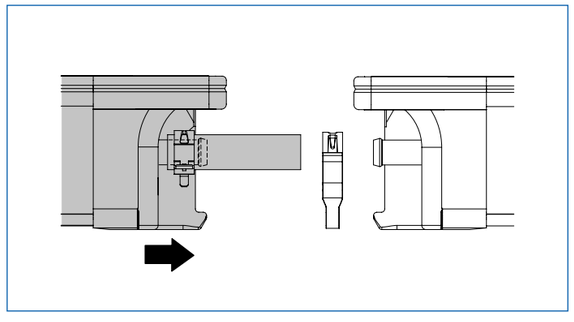
Worcester Greenskies Solar-Lux panels have easy screw fit connections with no additional pipework needed to join two panels together.

An accessory cover (Part No. 8 718 530 872) is available to slot over this pipework join to make the manifold seem continuous. This cover is also insulated.



Flat plate connections – Solar-Lifestyle and Solar-Lito

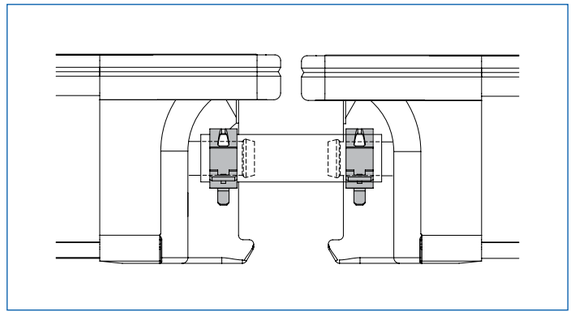
Worcester Greenskies Solar-Lifestyle and Solar-Lito panels are equipped with simple push-fit connections which speed installation and, with bespoke flexible hoses, aid the routing of pipework into the roofspace. Once inside the property the system should be run with copper pipe. Flexible hose connections are secured with a simple quick release clip which closes automatically and allows the time required for pipework on the roof to be reduced.



Subsequent collectors in series also use the flexible hose connection method to enable arrays to be plumbed-in with ease.

The second panel (of a two panel array) can be added easily with push-fit connections and quick-release clips.

Specific connector sets are available for on-roof, integrated roof and flat roof installations.



Other installation requirements/notes – all Greenskies panels

The installation of the Worcester solar system must be carried out in accordance with the relevant requirements for safety, current Wiring Regulations, local Building Regulations, Building Standards (Scotland), (Consolidation) Regulations and Bylaws of the local water company and Health and Safety document No. 63S (Electricity at Work Regulations 1989). It should be in accordance with the relevant recommendations of the following British Standards and Regulations:

- BS 5918:1989
- The Health and Safety at Work Act 1974
- The Management of Health and Safety at Work Regulations 1999
- The Construction (Health, Safety and Welfare) Regulations 1996
- The Construction (Design and Management) Regulations 1994
- The Lifting Operations and Lifting Equipment Regulations 1998, and any other relevant regulations in force at this time.

The manufacturer's notes must not be taken in any way as overriding statutory regulations.

Electricity supply

A 3 amp fused spur (complying with BS 1363) with a double pole isolator with a contact separation of 3mm in all poles supplying the controller should be used. The controller must be earthed.

Glycol heat transfer liquid

Worcester Greenskies solar panels and system components should be used only with the recommended heat transfer liquid

Greenskies Solar-Lux
Tyfocor©LS manufactured by Tyforop Chemie GmbH, available from stockists of Worcester Greenskies solar panels.

Greenskies Solar-Lifestyle and Solar-Lito
Tyfocor©L manufactured by Tyforop Chemie GmbH, available from stockists of Worcester Greenskies solar panels

Both heat transfer liquids use a proven concentration of antifreeze and water to give protection against freezing and provide optimum performance from the panels and system.

Tyfocor©L heat transfer fluid must never be used in Greenskies Solar-Lux evacuated tube panels. Only Tyfocor©LS heat transfer fluid is permissible.

Hot water blending valve

It is recommended a thermostatic blending valve be used in conjunction with the solar cylinder in order to guard against the high hot water temperatures which the system could provide.

Insulation

Exposed pipework should be insulated according to the high temperatures that the panels are able to generate Insulation rated to 150ºC must be used.

Pre-cooling vessels

It is recommended to use a pre-cooling vessel with all Worcester Greenskies Solar-Lux installations, unless the installer can be sure that the installation will represent less than 60% of solar fraction. This should be tee'd in 20-30cm above the pump station on the return pipe and above the expansion vessel.

Pressure relief valve

The solar pump stations in the Worcester Greenskies solar range are equipped with a 6bar pressure relief valve which should be connected to pipe work that terminates in a suitable container. The Solar safety discharge bottle accessory is suitable for Worcester flat plate systems. Alternatively, the pipework can be run to a foul drain or soil stack.

Guarantee

Worcester is proud to offer a guarantee of 10 years on the Greenskies solar panels and a 2 years' warranty on other components providing the panels are registered. It is important that the installer makes a note of the panel serial numbers to be able to successfully register the warranty. Please visit **www.worcesterbosch.co.uk/guarantee** to complete the online guarantee registration form.

Greenskies twin-coil hot water cylinders offer a 25 years' guarantee with a 2 years' warranty on components.

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Greenskies solar thermal controls

The Worcester Greenskies controls use a simple temperature difference to define when the pump runs. The temperature in the panel must be 8ºC higher than the store for the pump to start running. This will continue until the panel temperature gets to 4ºC above the store and then the pump will stop. This ensures that the pump is only running when the benefit from the solar panels is available.

There are 2 Worcester solar controllers available to complement both Greenskies evacuated tubes and flat plate.

TDS100
The standard controller is the TDS100. The TDS100 features 3NTC sensor inlets and a clear LCD graphic display with a pictogram menu. The controller can also control the modulation of the pump station to save energy consumption.

TDS300
The TDS300 is a multi-function, modulating controller which is suitable for use with a wide range of system configurations, including East/West splits and properties with swimming pools. It incorporates 8 NTC sensor inlets and a scrollable full text menu with 27 pre-figured systems with display pictograms. The TDS300 can also modulate the pump station to save energy consumption. The TDS300 can accommodate an additional cylinder sensor or additional panel sensors – also necessary for East/West split systems.

Boiler control integration

There are also control options available which will integrate the solar controller with a Worcester intelligent boiler controller. An ISM1 module is required in conjunction with either an FR110 or FW100 controller.

ISM1
A special interface that enables the hot water system to take heat from the panels when the sun is shining and then bring the boiler back on when there is not enough sunshine available. Compatible with Greenstar system boilers with an integral diverter valve. ISM1 must be used with the FR110 or FW100 and negates the need for a specific solar controller.

FR110 & FW100
Part of the Worcester FX boiler control series. Either of these boiler controls can be used with the ISM1 to optimise the combination of the boiler and solar. Please see the Worcester Controls series Technical and Specification brochure for more information.

Pump stations

There are 3 pump station categories to choose from – the AGSe single line pumps, the AGS twin line pumps and the AGS controller integrated pumps. All 3 pump stations are compatible with evacuated tubes and flat plate panels.

AGSe single line pump stations
AGS5e: Ideal for where space is limited (i.e. airing cupboards) or to minimise the use of pipe work when the cylinder is sited far away from the pump station. The AGS5e is a basic single line pump station which can be modulated when combined with either the TDS100 or TDS300 controller. It features a 6 bar pressure relief valve and 15mm connections. It can also be used with an AGS twin line pump station for an East West split*. The AGS5e is a cost-effective solution that can accommodate up to 5 flat plate collectors and 24 tubes.

AGS10e: As per the AGS5e, except it has 22mm connections and can save costs accommodating between 6 and 10 flat plate collectors and 30 to 60 tubes.

AGS twin line pump stations
AGS5: Standard pump station with integrated air separator to aid commissioning and maintenance. The AGS5 pump station also can be modulated when combined with either the TDS100 or TDS300 controller. It features a 6 bar pressure relief valve and 15mm connections. It can also be used with an AGSe twin line pump station for an East West split*.

The AGS5 can accommodate up to 5 flat plate collectors and 24 tubes.
AGS10: As per the AGS5, except it has 22mm connections and can accommodate between 6 and 10 flat plate collectors and 30 to 60 tubes.

**Also requires a TDS300 controller*

AGS controller integrated twin line pump station
AGS5/TDS100: twin line pump station with TDS100 controller for space saving and installation ease. Pump station features a 6 bar pressure relief valve and 15mm connections and can accommodate up to 5 flat plate collectors and 24 tubes.

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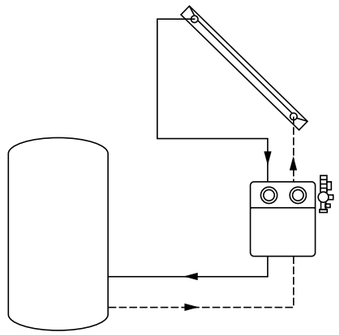
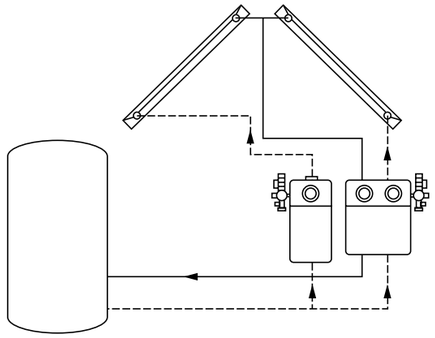
Pump station configuration options

1



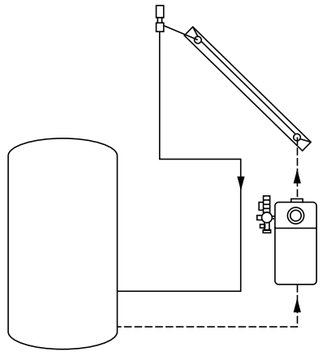
Standard system with 2-line solar pump station

2



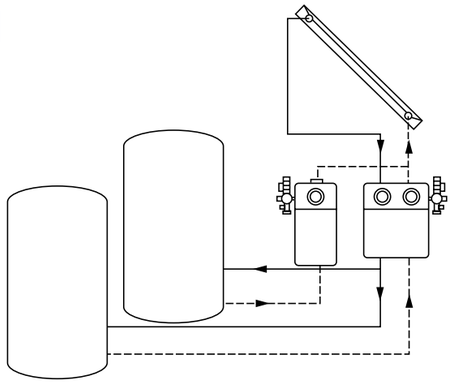
Two collector arrays (east/west) with 1-line and 2-line solar pump stations

3



Standard system with 1-line solar pump station and air vent on roof

4



Dual-tank system with 1-line and 2-line solar pump stations

Solar safety discharge bottle – important information

NEW

The introduction of a new solar discharge bottle is designed to provide a neater and safer method of discharge for the PRV outlet.

The discharge bottle is also compliant with best practice and future standards, which state that the receptacle should be able to contain the entire contents of the system above the safety valve. For extra safety, the bottle also displays a warning label to notify of the potential hazard with discharged glycol.

Benefits for customers

As well as having a more aesthetically pleasing installation, customers benefit from the peace of mind that, unlike many current solutions, this discharge bottle is fully tested to ensure safety under normal operating conditions.

Another key feature of the discharge bottle is that it is see-through, so that customers can see any discharge and notify the installer that there may be a problem.

Technical overview

The total length of pipework in the system should not exceed the values shown in the table below for the corresponding amount and type of collectors and pipe diameter.

The solar discharge bottle is recommended only for use in flat plate solar systems.

Acceptable total pipe lengths in total (flow and return)								
Number of panels	Solar-Lifestyle portrait		Solar-Lifestyle landscape		Solar-Lito		Solar-Lito Mini	
	15mm	22mm	15mm	22mm	15mm	22mm	15mm	22mm
1	56	25	53	24	57	26	58	26
2	49	22	44	20	51	23	54	24
3	43	19	35	15	46	21	49	22
4	36	16	26	11	40	18	45	20
5	30	14	16	–	35	8.9	41	18
6	24	10	–	–	29	13	37	16
7	17	–	–	–	24	11	32	14
8	–	–	–	–	19	8	28	12
9	–	–	–	–	13	–	24	11
10	–	–	–	–	–	–	20	9

Shown in the table are permissable total combined flow and return pipe lengths (for either 15mm or 22mm pipework) for typical Worcester flat panel systems. Any longer total pipework than the values shown and an alternative suitable discharge receptacle to the Greenskies solar discharge bottle should be used.

The Greenstore TC cylinder series

Unvented duplex stainless steel twin-coil cylinders

Worcester's Greenstore TC twin coil, stainless steel hot water storage cylinders have been specifically designed for use with solar heating installations, although installations incorporating two boilers are also possible. As such, they offer outstanding efficiency, ease of installation and full compliance with current and anticipated legislation and best practice.

Developed and manufactured by Bosch Thermotechnology Ltd., the Greenstore TC series comprises five models. A new TC-150 cylinder is being introduced and compliments the TC-180 to TC-300 which replace the Greenskies models. All models feature high levels of insulation and dedicated solar volumes in compliance with current Building Regulations, SAP 2009 and the Microgeneration Certification Scheme (MCS).

Greenstore TC cylinder series features and benefits

Feature	Benefit
65mm of factory-fitted insulation	Very low stand-by heat loss
Dedicated solar volume in accordance with MCS Scheme	Access to the proposed Renewable Heat Incentive (RHI) funding
Multiple sensor/thermostat pockets	Allows flexible and easy system integration for flexible control solutions
Wider range (TC-150 to TC-300)	Optimised hot water storage for Greenskies flat plate and evacuated tube solar panel series
Stand by heat loss meets anticipated 2013 Building Regulations	Future-proofed product

Installer benefits

The Greenstore TC range has been designed very much with the needs of the installer in mind:

- The Greenstore TC design offers higher levels of flexibility and system integration, making it easier for installers to tailor systems to suit a wide range of layouts. Multiple sensor/thermostat pockets provide flexible control solutions, with enhanced integration to other heat sources such as gas or oil-fired boilers, as well as full compatibility with Worcester control systems
- The new TC-150 cylinder offers optimised hot water storage capacity for Worcester Greenskies Solar range
- Greenstore TC cylinders are supplied complete with a G3 accessory kit and include a factory-installed temperature and pressure relief valve and a pre-installed 3kW electrical immersion heater
- All components fitted or supplied with a Greenstore TC cylinder carry a 2 year guarantee
- The duplex stainless steel shell is guaranteed for 25 years, subject to terms and conditions.

Benefits to the customer

- Customers who opt for solar heating are very focused on energy efficiency and carbon emissions and the Greenstore TC range is designed to address these priorities
- All cylinders offer high standards of heat retention (65mm insulation), with much lower stand-by heat losses than most competing products. In fact, the cylinders exceed the requirements of the Building Regulations 2010 Part L and are compliant with the anticipated requirements of the Building Regulations 2013
- Greenstore TC cylinders are also fully MCS compliant with a dedicated solar volume of 25 litres of storage per m² of solar panel installation. This compliance is vital in enabling customers to gain access to funding from the proposed Renewable Heat Incentive.

The Greenstore TC cylinder range at a glance

		Greenstore TC cylinder		
Diameter		570mm		
Height				
	Greenstore TC-150	1285mm		
	Greenstore TC-180	1490mm		
	Greenstore TC-210	1665mm		
	Greenstore TC-250	1860mm		
	Greenstore TC-300	2155mm		
Weight (dry)				
	Greenstore TC-150	36kg		
	Greenstore TC-180	38kg		
	Greenstore TC-210	45kg		
	Greenstore TC-250	49kg		
	Greenstore TC-300	53kg		
Thermostat pockets		4x thermostat bosses internal diameter 20.4mm		
DHW cold – in		22mm		
DHW hot – out		22mm		
Primary coil (boiler or solar)		22mm		
Secondary coil		22mm		
Secondary return		22mm		
Balanced pressure cold water outlet		22mm		
Pressure relief valve		15mm		
Standing heat loss performance				
	Greenstore TC-150	1.27kWh/24hrs		
	Greenstore TC-180	1.31kWh/24hrs		
	Greenstore TC-210	1.42kWh/24hrs		
	Greenstore TC-250	1.52kWh/24hrs		
	Greenstore TC-300	1.93kWh/24hrs		
Storage volume		**Total capacity**	**Dedicated solar volume**	**m² solar collector field for MCS compliance**
	Greenstore TC-150	158 litres	65 litres	1x panel (2.2m²)
	Greenstore TC-180	187 litres	65 litres	1x panel (2.2m²)
	Greenstore TC-210	211 litres	110 litres	2x panels (4.4m²)
	Greenstore TC-250	241 litres	115 litres	2x panels (4.4m²)
	Greenstore TC-300	287 litres	115 litres	2x panels (4.4m²)

Part number	Cylinder
7 716 800 542	Greenstore TC-150 Cylinder
7 716 800 543	Greenstore TC-180 Cylinder
7 716 800 544	Greenstore TC-210 Cylinder
7 716 800 545	Greenstore TC-250 Cylinder
7 716 800 546	Greenstore TC-300 Cylinder

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Homeowner FAQs

Q. What is sustainable energy?

A. Sustainable energy is best thought of as energy which can be replenished within a human lifetime and which causes no long-term damages to the environment. Solar energy, wind energy and geothermal energy, amongst others, are all self-sustaining. They all have sources that cannot be depleted. Extended use of these energy sources aids the conservation of other non-renewable energy sources such as fossil fuels.

Q. How does solar technology work?

A. The idea behind technologies which use solar energy is to harness the freely available rays from the sun in a useful form. The technology used for solar water heating is simple and effective. The basic principle uses an absorber plate which is heated by the sun's rays. This heat is collected in a transfer liquid which is in turn used in a heat exchanger to heat water.

Q. What if there is no sun or it is a cloudy day?

A. Special coatings are available on the absorber plates which allow the collector to absorb energy from diffused as well as direct sunlight. This means the panel can still yield results on days when there are clouds in the sky.

Q. Is there any Government funding available?

A. Solar thermal installations in England, Scotland and Wales which are installed from October 2011 by MCS accredited installers can qualify for a £300 voucher towards the cost under the Government's RHI Premium Payment initiative. The scheme is administered by the Energy Saving Trust and is due to finish in March 2012*. For the latest information call **0800 512 012** or visit **www.energysavingtrust.org.uk**.

Q. Do I have to pay VAT for installing solar panels?

A. The VAT on solar systems varies depending on who is installing it. DIY solar systems carry 20% VAT. A system which is installed by a professional VAT registered installer carries 5% VAT. For further information visit: www.hm-treasury.gov.uk

Q. Do I still need a boiler?

A. Solar heating on a normal domestic scale in the UK will provide around 50-70% of the average annual household hot water requirements. Although the system may provide most of the hot water required in summer, the winter results, due to the lower intensity of the sun and the shorter daylight hours, will be reduced. As such the householder will need a boiler (or suitable alternative) to make up the difference in domestic hot water requirement and for the central heating of the house.

Q. Do I need to have a particular type of roof for Solar installation?

A. In the UK the best orientation for solar panels is facing due south and tilted at between 30 and 45º from the horizontal. The gains available will reduce as the orientation moves away from due south. A variety of brackets and frames are available for solar systems to suit different roof types (pitched and flat) and different types of roof tiles.

**If the budget for the scheme is reached before this date no more vouchers will be issued. Correct at time of printing.*

Technical data glossary

In addition to the aperture area of the panels, which represents the area available to absorb solar energy, the η0 and a1 are the important factors to consider when choosing a solar panel.

The relationship between η0, a1 and aperture area are the main factors taken into consideration when assessing the property's compliance with building regulations.

η0

η0 represents the maximum power output ratio at 1,000W/m² solar irradiation when the solar fluid temperature is equal to the outside temperature. However, this performance value applies only in a very short period when the solar collector system is run up (e.g. immediately after being installed or in the morning when the sun comes up). The higher the η0 the better and these are generally more favourable towards flat plates than for evacuated tubes.

Coefficients a1 and a2

Every collector type has two specific heat throughput coefficients a1 and a2. They affect the slope of the power curve at rising temperature differences Delta T. a1 and a2 depend on the insulation properties of the collector. These are generally better for evacuated tubes than for flat plates – the lower the a1 and a2 figure, the better.

In terms of output, the output figure shown is in watts at irradiation of 1,000W/m². ΔT0 is when the outside air temperature equals the glycol in the panel temperature. ΔT30 represents a 30ºC difference between the panel and the outside air. You can see the output changes as these temperature differentials increase.

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Worcester Greenskies roof kits and plumb kits

To enable flexibility for the installer to choose their preferred combination of Greenskies accessories and also for installations where the roof work is done at a different time to the plumbing work, Worcester is proud to offer its solar products in roof kit and plumb kit form.

The roof kits contain the equipment that the installer requires to install the collectors on the roof including the panels, roof rails, hooks, hoses and panel sensor. The plumb kit can then be chosen to suit the needs of the installation and also ordered when required to complete the installation.

The standard roof and plumb kits are listed below, (sizing is an approximation to cylinder size).

Worcester has created standard kit part numbers for the installer to be able to order both a roof kit and a plumb kit to suit most needs.

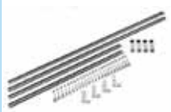
This provides everything that the installer requires to install the panels on the roof and also all of the main components for installation inside the property (a twin coil cylinder in the property and the pipe work connecting the panels to the pump station and cylinder are the responsibility of the installer).

Solar-Lux standard roof kits

Greenskies Solar-Lux kit 150 – 1 x Solar-Lux 6 panel roof kit
Part number: 7 716 150 162

Solar-Lux 6 collector	Solar-Lux connection set on-roof 6/12	On-roof set VT6/12	Roof connection tile – 4 pcs VT	Collector sensor
Worcester Part No. 8 718 530 558 Quantity: 1	Worcester Part No. 8 718 530 584 Quantity: 1	Worcester Part No. 8 718 530 851 Quantity: 1	Worcester Part No. 8 718 530 856 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

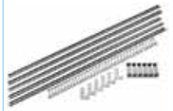
Greenskies Solar-Lux kit 200 easy lift – 2 x Solar-Lux 6 panel roof kit
Part number: 7 716 150 161

Solar-Lux 6 collector	Solar-Lux connection set on-roof 6/12	On-roof set 2 VT6	Roof connection tile – 4 pcs VT	Solar-Lux connection cover	Collector sensor
					
Worcester Part No. 8 718 530 558 Quantity: 2	Worcester Part No. 8 718 530 584 Quantity: 1	Worcester Part No. 8 718 530 848 Quantity: 1	Worcester Part No. 8 718 530 856 Quantity: 1	Worcester Part No. 8 718 530 872 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

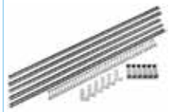
Greenskies Solar-Lux kit 200 – 1 x Solar-Lux 12 panel roof kit
Part number: 7 716 150 160

Solar-Lux 12 collector	Solar-Lux connection set on-roof 6/12	On-roof set VT6/12	Roof connection tile – 4 pcs VT	Collector sensor
Worcester Part No. 8 718 530 559 Quantity: 1	Worcester Part No. 8 718 530 584 Quantity: 1	Worcester Part No. 8 718 530 851 Quantity: 1	Worcester Part No. 8 718 530 856 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

Greenskies Solar-Lux kit 300 easy lift – 3 x Solar-Lux 12 panel roof kit
Part number: 7 716 150 159

Solar-Lux 6 collector	Solar-Lux connection set on-roof 6/12	On-roof set 3 VT6	Roof connection tile – 6 pcs VT	Solar-Lux connection cover	Collector sensor
					
Worcester Part No. 8 718 530 558 Quantity: 3	Worcester Part No. 8 718 530 584 Quantity: 1	Worcester Part No. 8 718 530 850 Quantity: 1	Worcester Part No. 8 718 530 907 Quantity: 1	Worcester Part No. 8 718 530 872 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

Greenskies Solar-Lux kit 300 combo – Solar-Lux 6 panel & Solar-Lux 12 panel roof kit
Part number: 7 716 150 158

Solar-Lux 6 collector	Solar-Lux 12 collector	Solar-Lux connection set on-roof 6/12	On-roof set 3 VT6	Roof connection tile – 6 pcs VT	Solar-Lux connection cover
					
Worcester Part No. 8 718 530 558 Quantity: 1	Worcester Part No. 8 718 530 559 Quantity: 1	Worcester Part No. 8 718 530 584 Quantity: 1	Worcester Part No. 8 718 530 850 Quantity: 1	Worcester Part No. 8 718 530 907 Quantity: 1	Worcester Part No. 8 718 530 872 Quantity: 1

Collector sensor
Worcester Part No. 7 747 009 880 Quantity: 1

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Solar-Lifestyle standard roof kits

Greenskies Solar-Lifestyle roof kit – 2 panels on-roof portrait
Part number: 7 716 150 164

Solar-Lifestyle collector portrait	ICD on-roof portrait rail 1st panel	ICD on-roof portrait rail additional panel	ICD plain tile roof hook set	Solar-Lifestyle connection set on-roof	Collector sensor
Worcester Part No. 8 718 530 950 Quantity: 2	Worcester Part No. 8 718 531 017 Quantity: 1	Worcester Part No. 8 718 531 018 Quantity: 1	Worcester Part No. 8 718 531 023 Quantity: 2	Worcester Part No. 8 718 531 445 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

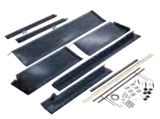
Greenskies Solar-Lifestyle roof kit – 2 panels on-roof landscape
Part number: 7 716 150 166

Solar-Lifestyle collector landscape	ICD on-roof landscape rail 1st panel	ICD on roof landscape rail additional panel	ICD plain tile roof hook set	Solar-Lifestyle connection set on-roof	Collector sensor
Worcester Part No. 8 718 530 951 Quantity: 2	Worcester Part No. 8 718 531 019 Quantity: 1	Worcester Part No. 8 718 531 022 Quantity: 1	Worcester Part No. 8 718 531 023 Quantity: 2	Worcester Part No. 8 718 531 445 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

Greenskies Solar-Lifestyle roof kit – 2 panels in-roof portrait
Part number: 7 716 150 165

Solar-Lifestyle collector portrait	ICD portrait 2 panel in-roof flashing std tile	Solar-Lifestyle connection-set in-roof	Collector sensor
Worcester Part No. 8 718 530 950 Quantity: 2	Worcester Part No. 8 718 530 981 Quantity: 1	Worcester Part No. 8 718 531 446 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

Greenskies Solar-Lifestyle roof kit – 2 panels in-roof landscape
Part number: 7 716 150 167

Solar-Lifestyle collector landscape	ICD landscape 2 panel in-roof flashing std tile	Solar-Lifestyle connection-set in-roof	Collector sensor
			
Worcester Part No. 8 718 530 951 Quantity: 2	Worcester Part No. 8 718 530 987 Quantity: 1	Worcester Part No. 8 718 531 446 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

Solar-Lito standard roof kits

Greenskies Solar-Lito roof kit – 1 panel
Part number: 7 716 150 168

Solar-Lito collector	Solar-Lito rail 1st panel	Std roof hook plain tile FKA3	Solar-Lito connection set on-roof	Collector sensor
Worcester Part No. 8 718 531 946 Quantity: 1	Worcester Part No. 7 709 600 087 Quantity: 1	Worcester Part No. 7 739 300 436 Quantity: 1	Worcester Part No. 8 718 531 941 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

Greenskies Solar-Lito roof kit – 2 panels
Part number: 7 716 150 169

Solar-Lito collector	Solar-Lito rail 1st panel	Solar-Lito rail additional panel	Std roof hook plain tile FKA3	Solar-Lito connection set on-roof	Collector sensor
Worcester Part No. 8 718 531 946 Quantity: 2	Worcester Part No. 7 709 600 087 Quantity: 1	Worcester Part No. 7 709 600 088 Quantity: 1	Worcester Part No. 7 739 300 436 Quantity: 2	Worcester Part No. 8 718 531 941 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

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Solar-Lito Mini standard roof kits

Greenskies Solar-Lito Mini roof kit – 150L row
Part number: 7 716 150 170

Solar-Lito Mini collector	Solar-Lito rail 1st panel	Solar-Lito rail additional panel	Std roof hook plain tile FKA3	Solar-Lito connection set on-roof	Collector sensor
Worcester Part No. 8 718 531 947 Quantity: 3	Worcester Part No. 7 709 600 087 Quantity: 1	Worcester Part No. 7 709 600 088 Quantity: 2	Worcester Part No. 7 739 300 436 Quantity: 3	Worcester Part No. 8 718 531 941 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

Greenskies Solar-Lito Mini roof kit – 200L row
Part number: 7 716 150 171

Solar-Lito Mini collector	Solar-Lito rail 1st panel	Solar-Lito rail additional panel	Std roof hook plain tile FKA3	Solar-Lito connection set on-roof	Collector sensor
Worcester Part No. 8 718 531 947 Quantity: 4	Worcester Part No. 7 709 600 087 Quantity: 1	Worcester Part No. 7 709 600 088 Quantity: 3	Worcester Part No. 7 739 300 436 Quantity: 4	Worcester Part No. 8 718 531 941 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

Greenskies Solar-Lito Mini roof kit – 250L row
Part number: 7 716 150 172

Solar-Lito Mini collector	Solar-Lito rail 1st panel	Solar-Lito rail additional panel	Std roof hook plain tile FKA3	Solar-Lito connection set on-roof	Collector sensor
Worcester Part No. 8 718 531 947 Quantity: 5	Worcester Part No. 7 709 600 087 Quantity: 1	Worcester Part No. 7 709 600 088 Quantity: 4	Worcester Part No. 7 739 300 436 Quantity: 5	Worcester Part No. 8 718 531 941 Quantity: 1	Worcester Part No. 7 747 009 880 Quantity: 1

Solar-Lux plumb kit

Solar-Lux plumb kit
Part number: 7 716 150 163

Solar fluid LS 20 litre	AGS5 pump station	TDS100 controller	25 litre expansion vessel	Expansion vessel connector	5 litre pre-cooling vessel
Worcester Part No. 8 718 660 947 Quantity: 1	Worcester Part No. 7 747 009 442 Quantity: 1	Worcester Part No. 7 747 004 420 Quantity: 1	Worcester Part No. 7 739 300 119 Quantity: 1	Worcester Part No. 7 739 300 331 Quantity: 1	Worcester Part No. 7 747 010 472 Quantity: 1

Solar-Lifestyle and Solar-Lito plumb kits

Flat plate plumb kit: standard single
Part number: 7 716 150 174

Solar fluid Glycol 'L' 20 litre	AGS5e pump station	TDS100 controller	18 litre expansion vessel	Expansion vessel connector
Worcester Part No. 8 718 660 881 Quantity: 1	Worcester Part No. 7 747 009 456 Quantity: 1	Worcester Part No. 7 747 004 420 Quantity: 1	Worcester Part No. 7 739 300 100 Quantity: 1	Worcester Part No. 7 739 300 331 Quantity: 1

Flat plate plumb kit: standard twin
Part number: 7 716 150 175

Solar fluid Glycol 'L' 20 litre	AGS5 pump station	TDS100 controller	25 litre expansion vessel	Expansion vessel connector
Worcester Part No. 8 718 660 881 Quantity: 1	Worcester Part No. 7 747 009 442 Quantity: 1	Worcester Part No. 7 747 004 420 Quantity: 1	Worcester Part No. 7 739 300 119 Quantity: 1	Worcester Part No. 7 739 300 331 Quantity: 1

Flat plate plumb kit: advanced single
Part number: 7 716 150 173

Solar fluid Glycol 'L' 20 litre	AGS5e pump station	TDS300 controller	18 litre expansion vessel	Expansion vessel connector
Worcester Part No. 8 718 660 881 Quantity: 1	Worcester Part No. 7 747 009 456 Quantity: 1	Worcester Part No. 7 747 004 427 Quantity: 1	Worcester Part No. 7 739 300 100 Quantity: 1	Worcester Part No. 7 739 300 331 Quantity: 1

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Product selector

By using the simple step-by-step guide in the following tables you can determine all of the components, their appropriate part numbers and the quantity of each item required for a particular installation. Simply choose the quantity of panels required and follow the coloured column down to find the quantity of each item required.

Solar-Lux 6 on-roof panel option

Step 1: Choose panel quantities	**6 tube – choose how many panels are required**			**Quantity required**			
	Solar-Lux 6	**8 718 530 558**	Solar-Lux 6	**1**	**2**	**3**	**4**
	Accompanying rails required for typical row configuration						
	Rails	**8 718 530 851**	On-roof set VT6/12	1	N/A	N/A	N/A
		8 718 530 848	On-roof set 2 VT6	N/A	1	N/A	2
		8 718 530 850	On-roof set 3 VT6	N/A	N/A	1	N/A

Step 2: Choose the roof type	**Quantity of panels chosen in step 1:**			**1**	**2**	**3**	**4**
	Roof / hook mounting required			**Quantity required**			
	Plain / pan tile roof	**8 718 530 856**	Roof connection tile, 4 pcs VT	1	1	N/A	2
		8 718 530 907	Roof connection tile, 6 pcs VT	N/A	N/A	1	N/A
	or						
	Slate / crown tile roof	**8 718 530 858**	Roof connection shingles, 4 pcs VT	1	1	N/A	2
		8 718 530 909	Roof connection shingles, 6 pcs VT	N/A	N/A	1	N/A
	or						
	Corrugated roof	**8 718 530 857**	Roof connection corrugated roof, 4 pcs VT	1	1	N/A	2
		8 718 530 908	Roof connection corrugated roof, 6 pcs VT	N/A	N/A	1	N/A

Step 3: Include connection set & cover	**Quantity of panels chosen in step 1:**			**1**	**2**	**3**	**4**
	Panel connection hose required per total installation			**Quantity required**			
	On-roof	**8 718 530 584**	Connection set on-roof Solar-Lux 6/12	1	1	1	1
	Cover (optional)			**Quantity required**			
	Cover	**8 718 530 872**	Solar-Lux connection cover	N/A	1	2	3

Step 4: Move to plumb equipment option – refer to page 50

Solar-Lux 12 on-roof panel option

Step 1: Choose panel quantities	**12 tube – choose how many panels are required**			**Quantity required**		
	Solar-Lux 12	**8 718 530 559**	Solar-Lux 12	**1**	**2**	**3**
	Accompanying rails required for typical row configuration					
	Rails	**8 718 530 851**	On-roof set VT6/12	1	2	3

Step 2: Choose the roof type	**Quantity of panels chosen in step 1:**			**1**	**2**	**3**
	Roof / hook mounting required			**Quantity required**		
	Plain / Pan tile roof	**8 718 530 856**	Roof connection tile, 4 pcs VT	1	2	3
	or					
	Slate / Crown tile roof	**8 718 530 858**	Roof connection shingles, 4 pcs VT	1	2	3
	or					
	Corrugated roof	**8 718 530 857**	Roof connection corrugated roof, 4 pcs VT	1	2	3

Step 3: Include connection set & cover	**Quantity of panels chosen in step 1:**			**1**	**2**	**3**
	Panel connection hose required per total installation			**Quantity required**		
	On-roof	**8 718 530 584**	Connection set on-roof Solar-Lux 6/12	1	1	1
	Cover (optional)			**Quantity required**		
	Cover	**8 718 530 872**	Solar-Lux connection cover	N/A	1	2

Step 4: Move to plumb equipment option – refer to page 50

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Solar-Lux 6 & Solar Lux 12 combination on-roof panel option

	Combination of tubes – choose how many panels are required			Quantity required
Step 1: Choose panel quantities	Solar-Lux 6	**8 718 530 558**	Solar-Lux 6	**1**
	Solar-Lux 12	**8 718 530 559**	Solar-Lux 12	**1**
	Accompanying rails required for typical row configuration			
	Rails	**8 718 530 850**	On-roof set 3 VT6	1

	Roof / hook mounting required			Quantity required
Step 2: Choose the roof type	Plain / Pan tile roof	**8 718 530 907**	Roof connection tile, 6 pcs VT	1
	or			
	Slate / crown tile roof	**8 718 530 909**	Roof connection shingles, 6 pcs VT	1
	or			
	Corrugated roof	**8 718 530 908**	Roof connection corrugated roof, 6 pcs VT	1

	Panel connection hose required per total installation			Quantity required
Step 3: Include connection set & cover	On-roof	**8 718 530 584**	Connection set on-roof Solar-Lux 6/12	1
	Cover (optional)			**Quantity required**
	Cover	**8 718 530 872**	Solar-Lux connection cover	1

Step 4: Move to plumb equipment option – refer to page 50

Solar-Lux 6 flat roof panel option

	6 tube – choose how many panels are required			Quantity required			
Step 1: Choose panel quantities	Solar-Lux 6	**8 718 530 558**	Solar-Lux 6	**1**	**2**	**3**	**4**
	Accompanying rails required for typical row configuration						
	Rails	**8 718 530 851**	On-roof set VT6/12	1	2	3	4

	Quantity of panels chosen in step 1:			**1**	**2**	**3**	**4**
Step 2: Choose desired angle of installation	**Choose desired angle**			**Quantity required**			
	Flat roof frame 45°	**8 718 530 852**	Roof connection flat roof 45° VT	1	2	3	4
	or						
	Flat roof frame 30°-60°	**8 718 530 853**	Roof connection flat roof 30° / Façade 60° VT	1	2	3	4

	Quantity of panels chosen in step 1:			**1**	**2**	**3**	**4**
Step 3: Include connection set & cover	**Panel connection hose required per total installation**			**Quantity required**			
	Flat roof	**8 718 530 585**	Connection set flat-roof Solar-Lux 6/12	1	1	1	1
	Cover (optional)			**Quantity required**			
	Cover	**8 718 530 872**	Solar-Lux connection cover	N/A	1	2	3

Step 4: Move to plumb equipment option – refer to page 50

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Solar-Lux 12 flat roof panel option

Step 1: Choose panel quantities	**12 tube – choose how many panels are required**			**Quantity required**		
	Solar-Lux 12	**8 718 530 559**	Solar-Lux 12	**1**	**2**	**3**
	Accompanying rails required for typical row configuration					
	Rails	**8 718 530 851**	On-roof set VT6/12	1	2	3
Step 2: Choose desired angle of installation	**Quantity of panels chosen in step 1:**			**1**	**2**	**3**
	Choose desired angle			**Quantity required**		
	Flat roof frame 45°	**8 718 530 852**	Roof connection flat roof 45° VT	1	2	3
	or					
	Flat roof frame 30°-60°	**8 718 530 853**	Roof connection flat roof 30° / Façade 60° VT	1	2	3
Step 3: Include connection set & cover	**Quantity of panels chosen in step 1:**			**1**	**2**	**3**
	Panel connection hose required per total installation			**Quantity required**		
	Flat roof	**8 718 530 585**	Connection set flat-roof Solar-Lux 6/12	1	1	1
	Cover (optional)			**Quantity required**		
	Cover	**8 718 530 872**	Solar-Lux connection cover	N/A	1	2

Step 4: Move to plumb equipment option – refer to page 50

Solar-Lux 6 & Solar Lux 12 combination flat roof panel option

Step 1: Choose panel quantities	**Combination of tubes – choose how many panels are required**			**Quantity required**
	Solar-Lux 6	**8 718 530 558**	Solar-Lux 6	**1**
	Solar-Lux 12	**8 718 530 559**	Solar-Lux 12	**1**
	Accompanying rails required for typical row configuration			
	Rails	**8 718 530 850**	On-roof set 3 VT6	2
Step 2: Choose desired angle of installation	**Choose desired angle**			**Quantity required**
	Flat roof frame 45°	**8 718 530 852**	Roof connection flat roof 45° VT	2
	or			
	Flat roof frame 30°-60°	**8 718 530 853**	Roof connection flat roof 30° / Façade 60° VT	2
Step 3: Include connection set & cover	**Panel connection hose required per total installation**			**Quantity required**
	Flat roof	**8 718 530 585**	Connection set flat-roof Solar-Lux 6/12	1
	Cover (optional)			**Quantity required**
	Cover	**8 718 530 872**	Solar-Lux connection cover	1

Step 4: Move to plumb equipment option – refer to page 50

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Plumb equipment option for Greenskies Solar-Lux

Step 1: Choose pump station

Single line pump station	7 747 009 456	Solar pump station AGS5e 1-5 collectors	Choose at least 1 per installation. East west / split requires 1 x single line and 1 x twin line
	7 747 009 427	Solar pump station AGS10e 6-10 collectors	
Twin line pump station	7 747 009 442	Solar pump station AGS5 1-5 collectors	
	7 747 009 420	Solar pump station AGS10 6-10 collectors	
	7 747 008 776	Solar pump station AGS5/TDS100 with integrated controller	

Step 2: Choose controller

Standard controller	7 747 004 420	Solar controller TDS100	Choose 1 per installation. (Advanced controller required for multiple pump station configurations)
Advanced controller	7 747 004 427	Solar controller TDS300	

Step 3: Choose an expansion vessel & pre-cooling

Expansion vessels	7 739 300 100	Expansion vessel 18 litre	Choose 1 per pump station depending on size required
	7 739 300 119	Expansion vessel 25 litre	
	7 739 300 120	Expansion vessel 35 litre	
Expansion connection	7 739 300 331	Solar expansion vessel connection	1 per expansion vessel
Pre-cooling	7 747 010 472	Pre cooling vessel 5 litre	For systems with 60% or greater solar fraction. Recommended for every Solar-Lux installation
	7 747 010 473	Pre cooling vessel 10 litre	

Step 4: Choose glycol quantity

Evacuated tube glycol	8 718 660 947	Solar fluid LS 20	At least 20 litre recommended per installation
	8 718 660 946	Solar fluid LS 10	

Additional accessories

Sensors	7 747 009 880	Additional collector sensor	For east/west splits or to accompany first fix roof kits
	7 747 009 881	Additional cylinder sensor	For systems using additional cylinders
Solar-Lux valve	8 718 530 911	Shut-off valve VT	For collector fields with parallel connected rows – 1 per row

Commissioning and service

Electric filling pump	8 718 530 473	Electric filling pump
Solar service kit	7 739 300 397	Solar service kit

Solar-Lifestyle on-roof panel option

Step 1: Choose panel quantities and orientation	**Portrait – choose how many panels are required**			**Quantity required**				
	Portrait panel	8 718 530 950	Solar-Lifestyle collector portrait	1	2	3	4	5
	Accompanying rails required for typical row configuration							
	Portrait rails	8 718 531 017	ICD on-roof portrait rail 1st panel	1	1	1	1	1
		8 718 531 018	ICD on-roof portrait rail additional panel	N/A	1	2	3	4
	Landscape – choose how many panels are required							
	Landscape panel	8 718 530 951	Solar-Lifestyle collector landscape	1	2	3	4	5
	Accompanying rails required for typical row configuration							
	Landscape rails	8 718 531 019	ICD on-roof landscape rail 1st panel	1	1	1	1	1
		8 718 531 022	ICD on-roof landscape rail additional panel	N/A	1	2	3	4

Step 2: Choose the roof type	**Quantity of panels chosen in step 1:**			1	2	3	4	5
	Roof / hook mounting required			**Quantity required**				
	Plain / pan tile roof	8 718 531 023	ICD plain tile roof hook set	1	2	3	4	5
	or							
	Slate / crown tile roof	8 718 531 024	ICD slate / crown tile roof hook set	1	2	3	4	5
	or							
	Corrugated roof	8 718 531 025	ICD roof mount for corrugated / tin roof set	1	2	3	4	5

Step 3: Include connection set	**Quantity of panels chosen in step 1:**			1	2	3	4	5
	Panel connection hose required per total installation			**Quantity required**				
	On-roof	8 718 531 445	Connection-set on-roof Solar-Lifestyle	1	1	1	1	1

Step 4: Move to plumb equipment option – refer to page 54

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Solar-Lifestyle in-roof panel option

Step 1: Choose panel quantities, orientation and flashing for roof type

Portrait – choose how many panels are required			Quantity required				
Portrait panel	**8 718 530 950**	Solar-Lifestyle collector portrait	**1**	**2**	**3**	**4**	**5**
Accompanying flashing required for typical row configuration							
Pan tile portrait flashing	**8 718 530 980**	ICD portrait 1 panel in-roof flashing	1	N/A	N/A	N/A	N/A
	8 718 530 981	ICD portrait 2 panel in-roof flashing	N/A	1	1	1	1
	8 718 530 982	ICD portrait 1 panel extension in-roof flashing	N/A	N/A	1	2	3
or							
Slate tile portrait flashing	**8 718 530 992**	ICD portrait 1 panel in-roof flashing slate/shingle	1	N/A	N/A	N/A	N/A
	8 718 530 993	ICD portrait 2 panel in-roof flashing slate/shingle	N/A	1	1	1	1
	8 718 530 994	ICD portrait 1 panel extension in-roof flashing slate/shingle	N/A	N/A	1	2	3
or							
Raised tile portrait flashing	**8 718 531 004**	ICD portrait 1 panel in-roof flashing raised tile	1	N/A	N/A	N/A	N/A
	8 718 531 005	ICD portrait 2 panel in-roof flashing raised tile	N/A	1	1	1	1
	8 718 531 006	ICD portrait 1 panel extension in-roof flashing raised tile	N/A	N/A	1	2	3

Landscape – choose how many panels are required			Quantity required				
Landscape panel	**8 718 530 951**	Solar-Lifestyle collector landscape	**1**	**2**	**3**	**4**	**5**
Accompanying flashing required for typical row configuration							
Pan tile landscape flashing	**8 718 530 986**	ICD landscape 1 panel in-roof flashing	1	N/A	N/A	N/A	N/A
	8 718 530 987	ICD landscape 2 panel in-roof flashing	N/A	1	1	1	1
	8 718 530 988	ICD landscape 1 panel extension in-roof flashing	N/A	N/A	1	2	3
or							
Slate tile landscape flashing	**8 718 530 998**	ICD landscape 1 panel in-roof flashing slate/shingle	1	N/A	N/A	N/A	N/A
	8 718 530 999	ICD landscape 2 panel in-roof flashing slate/shingle	N/A	1	1	1	1
	8 718 531 000	ICD landscape 1 panel extension in-roof flashing slate/shingle	N/A	N/A	1	2	3
or							
Raised tile landscape flashing	**8 718 531 010**	ICD landscape 1 panel in-roof flashing raised tile	1	N/A	N/A	N/A	N/A
	8 718 531 011	ICD landscape 2 panel in-roof flashing raised tile	N/A	1	1	1	1
	8 718 531 012	ICD landscape 1 panel extension in-roof flashing raised tile	N/A	N/A	1	2	3

Step 2: Include connection set

Panel connection hose required per total installation			Quantity required				
In-roof	**8 718 531 446**	Connection-set in-roof Solar-Lifestyle	1	1	1	1	1

Step 3: Move to plumb equipment option – refer to page 54

Solar-Lifestyle flat roof panel option

Step 1: Choose panel quantities, orientation and flashing for roof type

Portrait – choose how many panels are required			Quantity required				
Portrait panel	**8 718 530 950**	Solar-Lifestyle collector portrait	**1**	**2**	**3**	**4**	**5**
Accompanying flashing required for typical row configuration							
Portrait flat roof stand	**8 718 531 031**	ICD flat roof portrait support 1st panel	1	1	1	1	1
	8 718 531 032	ICD flat roof portrait support additional panel	N/A	1	2	3	4

Landscape – choose how many panels are required			Quantity required				
Landscape panel	**8 718 530 951**	Solar-Lifestyle collector landscape	**1**	**2**	**3**	**4**	**5**
Accompanying rails required for typical row configuration							
Landscape flat roof stand	**8 718 531 033**	ICD flat roof landscape support 1st panel	1	1	1	1	1
	8 718 531 034	ICD flat roof landscape support additional panel	N/A	1	2	3	4

Step 2: Include connection set

Panel connection hose required per total installation			Quantity required				
Flat roof	**8 718 531 447**	Connection-set flat roof Solar-Lifestyle	1	1	1	1	1

Step 3: Move to plumb equipment option – refer to page 54

Auxiliary accessories

8 718 531 026	ICD portrait auxiliary rail 1st panel
8 718 531 027	ICD portrait auxiliary rail additional panel
8 718 531 036	ICD flat roof portrait auxiliary rail 1 panel
8 718 531 037	ICD flat roof landscape auxiliary rail 1 panel
8 718 531 028	ICD portrait snow load profile plain tile
8 718 531 029	ICD portrait snow load profile slate/shingle
8 718 531 030	ICD portrait snow load profile corrugated/tin
8 718 531 035	ICD flat roof loading tray set 1 panel

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Plumb equipment option for Greenskies Solar-Lifestyle

Step 1: Choose pump station

Single line pump station	7 747 009 456	Solar pump station AGS5e 1-5 collectors	Choose at least 1 per installation. East west / split requires 1 x single line and 1 x twin line
	7 747 009 427	Solar pump station AGS10e 6-10 collectors	
Twin line pump station	7 747 009 442	Solar pump station AGS5 1-5 collectors	
	7 747 009 420	Solar pump station AGS10 6-10 collectors	
	7 747 008 776	Solar pump station AGS5/TDS100 with integrated controller	

Step 2: Choose controller

Standard controller	7 747 004 420	Solar controller TDS100	Choose 1 per installation. (Advanced controller required for multiple pump station configurations)
Advanced controller	7 747 004 427	Solar controller TDS300	

Step 3: Choose an expansion vessel

Expansion vessels	7 739 300 100	Expansion vessel 18 litre	Choose 1 per pump station depending on size required
	7 739 300 119	Expansion vessel 25 litre	
	7 739 300 120	Expansion vessel 35 litre	
Expansion connection	7 739 300 331	Solar expansion vessel connection	1 per expansion vessel

Step 4: Choose glycol quantity

Flat plate glycol	8 718 660 881	Solar fluid 20 litre	At least 20 litre recommended per installation
	8 718 660 880	Solar fluid 10 litre	

Additional accessories

Sensors	7 747 009 880	Additional collector sensor	For east/west splits or to accompany first fix roof kits
	7 747 009 881	Additional cylinder sensor	For systems using additional cylinders
Pre-cooling	7 747 010 472	Pre cooling vessel 5 litre	For systems with 60% or greater solar fraction
	7 747 010 473	Pre cooling vessel 10 litre	
Discharge container	7 716 192 348	Solar discharge bottle	To contain expelled glycol from PRV discharge

Commissioning and service

Electric filling pump	8 718 530 473	Electric filling pump
Solar service kit	7 739 300 397	Solar service kit

Solar-Lito on-roof panel option

Step 1: Choose panel quantities and orientation

Lito – choose how many panels are required			Quantity required					
Lito Panel	8 718 531 946	Solar-Lito panel	1	2	3	4	5	6
Accompanying rails required for typical row configuration								
Rails	7 709 600 087	On roof rail 1st panel	1	1	1	1	1	1
	7 709 600 088	On roof rail additional panel	N/A	1	2	3	4	5

Lito Mini – choose how many panels are required								
Lito Mini Panel	8 718 531 947	Solar-Lito Mini Panel	1	2	3	4	5	6
Accompanying rails required for typical row configuration (see page 27 for shape schematics)								
Row shape	7 709 600 087	On-roof rail 1st panel	1	1	1	1	1	1
	7 709 600 088	On-roof rail additional panel	N/A	1	2	3	4	5
or								
Column shape	7 709 600 087	On-roof rail 1st panel	1	2	3	4	5	6
	7 709 600 088	On-roof rail additional panel	N/A	N/A	N/A	N/A	N/A	N/A
	8 718 531 940	Series connection set Solar-Lito	N/A	1	2	3	4	5
or								
Special shape	7 709 600 087	On-roof rail 1st panel	N/A	N/A	2	2	3	2 | 3†
	7 709 600 088	On-roof rail additional panel	N/A	N/A	1	2	2	4 | 3†
	8 718 531 940	Series connection set Solar-Lito	N/A	N/A	1	1	2	1 | 2†

†Depending on orientation of shape

Step 2: Choose the roof type

Quantity of panels chosen in step 1:			1	2	3	4	5	6
Roof / hook mounting required			Quantity required					
Plain / pan tile roof	7 739 300 436	Std roof hook plain tile	1	2	3	4	5	6
or								
Slate / crown tile roof	7 739 300 281	Std slate / crown tile hook	1	2	3	4	5	6
or								
Corrugated roof	7 739 300 439	Std roof studs corrugated / tin roof	1	2	3	4	5	6

Step 3: Include connection set

Panel connection hose required per total installation			Quantity required					
On-roof	8 718 531 941	Connection set Solar-Lito on-roof	1	1	1	1	1	1

Step 4: Move to plumb equipment option – refer to page 56

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Plumb equipment option for Solar-Lito

Step 1: Choose pump station

Single line pump station	**7 747 009 456**	Solar pump station AGS5e 1-5 collectors	Choose at least 1 per installation. East west / split requires 1 x single line and 1 x twin line
	7 747 009 427	Solar pump station AGS10e 6-10 collectors	
Twin line pump station	**7 747 009 442**	Solar pump station AGS5 1-5 collectors	
	7 747 009 420	Solar pump station AGS10 6-10 collectors	
	7 747 008 776	Solar pump station AGS5/TDS100 with integrated controller	

Step 2: Choose controller

Standard controller	**7 747 004 420**	Solar controller TDS100	Choose 1 per installation. (Advanced controller required for multiple pump station configurations)
Advanced controller	**7 747 004 427**	Solar controller TDS300	

Step 3: Choose an expansion vessel

Expansion vessels	**7 739 300 100**	Expansion vessel 18 litre	Choose 1 per pump station depending on size required
	7 739 300 119	Expansion vessel 25 litre	
	7 739 300 120	Expansion vessel 35 litre	
Expansion connection	**7 739 300 331**	Solar expansion vessel connection	1 per expansion vessel

Step 4: Choose glycol quantity

Flat plate glycol	**8 718 660 881**	Solar fluid 20 litre	At least 20 litre recommended per installation
	8 718 660 880	Solar fluid 10 litre	

Additional accessories

Sensors	**7 747 009 880**	Additional collector sensor	For east/west splits or to accompany first fix roof kits
	7 747 009 881	Additional cylinder sensor	For systems using additional cylinders
Pre-cooling	**7 747 010 472**	Pre cooling vessel 5 litre	For systems with 60% or greater solar fraction
	7 747 010 473	Pre cooling vessel 10 litre	
Discharge container	**7 716 192 348**	Solar discharge bottle	To contain expelled glycol from PRV discharge

Commissioning and service

Electric filling pump	**8 718 530 473**	Electric filling pump
Solar service kit	**7 739 300 397**	Solar service kit

The very best training programmes from Worcester

Worcester has always placed great emphasis on technical support and training for installers and service engineers. Advances in heating technology, including the increasing use of renewables, make the need for training greater than ever.

To ensure the highest levels of competence and expertise in the installation of all Worcester products, the company runs intensive training courses for installers, commissioning engineers and operatives involved with servicing and fault finding.

Courses available

Our training facilities offer a number of courses suitable for the installer and commissioning engineers, and a more in-depth course for the servicing and fault finding engineers.

Training centres throughout the UK

To enable us to meet the growing demand for training we have invested in additional facilities at the award-winning training academy at our Worcester headquarters. In addition to the original academy there is now a new 400m^2 unit, 25% of which is devoted to an open-plan domestic training area with life-size single-storey brick buildings. These feature working Greenskies solar thermal systems which enable installers to get up onto the roof of the building to get more realistic training. There are bays full of all Greenstar gas-fired appliances, so installers can really get to grips with the importance of system design. The additional space will also contain dedicated training areas for our renewable and future products. The training centre will also run certified CODNC01 and COCN1 courses. CODNC01 equips installers with the relevant qualifications for the changeover from domestic to commercial gas work. COCN1 allows existing commercial installers to renew their qualification.

Further academies are located at West Thurrock in Essex, Bradford, Clay Cross in Derbyshire and Bangor in Northern Ireland, all offering our full suite of courses. Please phone 01905 752526 for more information about a course near you. Each course is run by specialist trainers and is superbly equipped to deliver a combination of classroom theory and practical hands-on experience that's second to none.

College-linked Learning

As well as offering training at our own centres, Worcester has established close partnerships with many colleges around the UK, equipping them with our latest products. Call us on 01905 752526 to find out when we will be running the course of your choice at a college in your area.

Mobile training

To complement our training venues across the country, we can also bring training to you.

We have mobile vehicles fully equipped with operational Greenstar gas-fired boilers, dry strip-down models and even a Greensource air to air heat pump, ensuring that quality training in a comfortable environment can be achieved on your doorstep!

If it's oil training you require, our 7.5 tonne mobile oil vehicle is available throughout the country for hands-on product training and OFTEC assessments.

Distance Learning/Web Based Learning

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We are here to provide you with training and assistance for all areas of your business, not just product training.
Call us on 01905 752526 to order a full training course brochure.

Boiler training courses		
Greenstar CDi gas-fired condensing combi boilers		
Models covered	Greenstar 27/30/37/42CDi	Duration: 1 day
Greenstar i Junior & Si gas-fired condensing combi boilers		
Models covered	Greenstar 24/28i Junior and Greenstar 25/30Si	Duration: 1 day
Greenstar Highflow CDi & FS CDi regular floor standing gas-fired condensing combi and regular boilers		
Models covered	Greenstar Highflow 440/550CDi and Greenstar FS 30/42CDi Regular	Duration: 1 day
Greenstar system & regular gas-fired condensing boilers		
Models covered	Greenstar 12/15/18/24Ri, Greenstar 30/40CDi Regular, Greenstar FS 30/42CDi Regular, Greenstar 30CDi System and Greenstar 12/15/18/24i System	Duration: 1 day
Greenstar Danesmoor, Heatslave & Camray high efficiency condensing oil-fired boilers – pre-OFTEC training		
Models covered	Greenstar Danesmoor series, Greenstar Heatslave series and Greenstar Camray series	Duration: 1 day
Greenstar controls		
Models covered	MT10, MT10RF, DT20RF, DT20, DT10RF, TD200, RT10, FR10, FR110, FW100 and ISM1	Duration: 1 day

Renewable training courses		
Greenskies solar hot water system		
Covering	Installation, commissioning and servicing	Duration: 2 days
Greenskies advanced solar		
Covering	Worcester solar control range and pump stations	Duration: 1 days
Greenstore ground source heat pumps		
Covering	Installation, commissioning and system design	Duration: 2 days
Greensource heat pumps – air to water		
Covering	Installation, commissioning and system design	Duration: 2 days
Greensource heat pumps – air to air		
Covering	Installation, commissioning and system design	Duration: 1 day
Greenfloor heating		
Covering	Installation, commissioning and servicing	Duration: 1 day
Greenstream MVHR		
Covering	Installation, commissioning and system design	Duration: 1 day

Industry focused training courses		
BPEC warm water underfloor heating installation		
Covering	Basic principles & advantages of underfloor heating, floor systems and finishes, operation, installation, testing and post installation activities	Duration: 2 days
BPEC ventilation		
Covering	Installation, commissioning, inspection and testing	Duration: 2 days
Hot water systems & safety		
Covering	All G3 Regulations for the installation, servicing and commissioning of unvented cylinders. This course is certified by Logic Certification.	Duration: 1 day
Chemical water treatment		
Covering	Water treatment of domestic heating systems in accordance with BS 7593: 2006	Duration: 1 day
Construction skills F-Gas training/assessment certification		
Covering	Qualifies for Construction Skills Certification & Registration (valid for 5 years) and Voluntary ACRIB Registration	Duration: 4 days

Domestic ACS training and assessment		
Initial CCN1 + 4 appliances + CPA1		
Covering	Designed for candidates whose qualifications expired more than 12 months ago	Duration: 5 day
Reassessment CCN1 + 4 appliances + CPA1		
Covering	Re-assessment for candidates whose CCN1 qualification expires in less than 12 months	Duration: 4 days

OFTEC training and assessment		
OFTEC 101		
Covering	Domestic/light commercial pressure jet commissioning and servicing	Duration: 3 days
OFTEC 105e		
Covering	Domestic/light commercial pressure jet boiler installation	Duration: 1 day assessment
OFTEC 101 & 105e		
Covering	Domestic/light commercial pressure jet installation, commissioning and servicing	Duration: 3 days
OFTEC 600a		
Covering	Oil tank installation and associated controls	Duration: 1 day assessment
OFTEC 101/105e/600e		
Covering	Domestic/light commercial pressure jet boiler installation, commissioning, servicing and oil tank installation and associated controls	Duration: 4 days
Mobile OFTEC		
All above covered throughout the country on the mobile training vehicle as well as in all our centres		

Please note to attend OFTEC courses you must have a minimum of 12 months' experience installing/servicing oil boilers. For inexperienced candidates, our Greenstar Danesmoor, Heatslave and Camray course offers pre-OFTEC training. For experienced oil technicians training is not a pre-requisite for OFTEC assessment.

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In addition to the no-nonsense parts and labour guarantee applicable to all Worcester products, you and your customers have the assurance that every Worcester product is manufactured to both the appropriate British and European standards.

Worcester Contact Centre

Should you require support, our fully trained Contact Centre staff, based at our head office in Worcester, are ready to take your calls. Whatever your query our contact centre operators along with our nationwide team of engineers are ready to help you.

Boiler Protection Options

Worcester offers boiler protection including service and maintenance contracts. Please call the Worcester Contact Centre for further details.

If you do not offer annual service and maintenance contracts please refer your customers to the Worcester Contact Centre:
Tel: 0844 892 3000
Fax: 01905 757 536

Opening Times

Monday – Friday: 7.00am – 8.00pm
Saturday: 8.00am – 5.00pm
Sunday: 9.00am – 12 noon

All the technical advice you need

Spares

Genuine replacement parts for all supported Worcester products are readily available from stock, on a next day delivery basis. For more information please call your local stockist. You can find a spares stockist on our website.

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The Worcester Technical Helpline is a dedicated phone line – committed to providing a comprehensive service to complement the brand name and quality of our products. Our experienced team of technical experts provides answers to queries of a technical nature across the entire Worcester range.

Worcester also has a pre-sales department, which provides assistance in selecting a heating system to suit a particular application, along with full guidance on installation. For more information please contact the Technical Helpline or alternatively visit our website where literature can be downloaded at **www.worcester-bosch.co.uk.**

Technical

Tel: 0844 892 3366
Fax: 01905 752 741

Renewables Helpline

Tel: 0844 892 4010
Email: renewable.energy@uk.bosch.com

Opening Times

Monday – Friday: 7.00am – 8.00pm
Saturday: 8.30am – 4.00pm

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Fax: 01905 754620

Technical Helpline (Pre & Post Sales)
Tel: 0844 892 3366
Fax: 01905 752741

Renewables Technical Helpline
Email: renewable.energy@uk.bosch.com
or telephone 0844 892 4010

Training
Tel: 01905 752526
Fax: 01905 752535

Literature
Email: literature@uk.bosch.com
or download instantly from our website
or telephone 0844 892 9800

Customer Service

Engineer Appointments
Email: appointment.worcester@uk.bosch.com
or telephone 0844 892 3000

Enquiries
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