

## Solar PV Systems

Flat roof solutions







Noah's Ark Children's Hospice,  
Barnet

#### BUILDING BOARD

Roof Size:	5,100 m <sup>2</sup>
Roof Systems:	BauderSOLAR G LIGHT with BauderBIODIVERSE and Bauder Total Green Roof System
Specifier:	Squire & Partners
Approved Contractor:	Voland Roofing Limited
Green Roof Contractor:	Bridgman & Bridgman
PV Installer:	Joju Solar

Bauder is a leading international manufacturer of flat roof waterproofing membranes and insulation to make buildings watertight and thermally efficient; photovoltaic installations for renewable energy generation; green roofs to support the environment and create living and working spaces for people; and blue roofs to attenuate stormwater.

Customers choose us because of the way we do business, our robust advice on the right solutions, and our approach to delivering projects. We collaborate with clients to find the optimal solution for a building from our broad portfolio of systems.



# Solar PV

## Photovoltaic (PV) systems for flat, green, and blue roof applications

Our solar PV mounting solutions are designed to be combined with our flat and green roof systems. BauderSOLAR (F and F XL) is for conventional flat roofs and BauderSOLAR G LIGHT is for creating biosolar flat roofs that combine PV with a green or blue roof.

Our solar photovoltaic (PV) mounting solutions are designed to ensure the Bauder waterproofing beneath remains intact and without compromise.

The entire installation process of both of our PV mounting systems is designed with time and simplicity in mind. Through our portfolio, we guarantee the entire Bauder-specified roof waterproofing and mounting package (excluding the solar PV panels), providing a single-source point of contact and responsibility to reduce risk.

### Specifying a solar PV array

A flat roof is the ideal place for a solar PV installation to generate site-sourced electricity. Renewable energy generation has a big role to play in the delivery of a net-zero carbon building and integrating renewables allows it to meet a proportion of its own energy needs, minimise carbon emissions, and reduce building running costs.

### Outline of our solar PV systems

- Two systems for new build and refurbishment projects: BauderSOLAR and BauderSOLAR G LIGHT
- Penetration-free installation of mounting system to reduce risk
- CCPI-assessed waterproofing and mounting system data
- Range of Bauder waterproofing options
- Range of guarantee packages to suit project and cover requirements

### Achieving technical objectives

- Bauder solar PV array designs meet MCS PV Guide requirements and IET Codes of Practice
- System designs comply with:
  - BSEN 62446 Grid Connected Photovoltaics
  - BSEN 61853-1 Defining Solar Photovoltaic Power
  - BSEN 1991-1-4 Wind Actions on Structures
  - BRE Digest - Wind loads on roof-mounted photovoltaic and solar thermal systems (DG 489 revised 2014)





# BauderSOLAR PV Solutions

## Two systems for creating a rooftop solar PV installation

Integrated mounting systems for photovoltaic solutions on flat roofs for both new build construction and retrofit for current buildings.

Through our systems we can guarantee the complete specified Bauder waterproofing and mounting systems, ensuring single point of contact and reduced risk.

### **BauderSOLAR F and BauderSOLAR F XL**

Our flat roof PV mounting systems are installed without penetrating the waterproofing system or roof slab/deck. The mounting systems are fully compatible with our single ply or bituminous membrane waterproofing solutions.

As module manufacturers strive to increase the efficiency of solar modules, the industry is moving to larger format cells and module structures.

BauderSOLAR FXL System allows the installation of larger format modules, to help provide our clients with the most efficient solar solutions for their flat roof projects. BauderSOLAR F is a solution for refurbishment projects that is compatible with a wide range of module sizes, helping to make replacing existing PV arrays more efficient.

### **BauderSOLAR G LIGHT**

Our biosolar PV mounting solution that integrates a Bauder green or blue roof using the substrate and vegetation as ballast to secure the array. This system allows for the entire roof area to qualify as a green roof, and if a biodiversity vegetation finish is specified, this can help the building achieve Urban Greening Factor (UGF), biodiversity net gain (BNG), and BREEAM ecology credits, whilst maximising solar generation.



Photo courtesy of Bauder Ltd.



# BauderSOLAR PV Design Fundamentals

## Brief outline of some key considerations

Solar PV is a popular and established renewable energy technology, and its specification is rising due to the combined importance of achieving net zero and reducing energy costs.

With recent fluctuations in energy markets and carbon reduction initiatives coming to the fore, the number of solar PV installations on flat roofs will continue to rise as local authorities and businesses look to reduce their carbon footprint and gain energy security for the future.

### Sizing of Solar PV systems

The size of the solar PV array is determined by the overall aim of the scheme, the building's energy consumption, available non-shaded roof space, and the client's budget.

On new build developments, the size of the array is typically determined by either Part L requirements or local planning conditions. If the target energy yield is not matched to the available roof area in the early design stages, it can lead to challenges with the layout, shading and the allowance for safe access and fire breaks in between the arrays and other roof top elements.

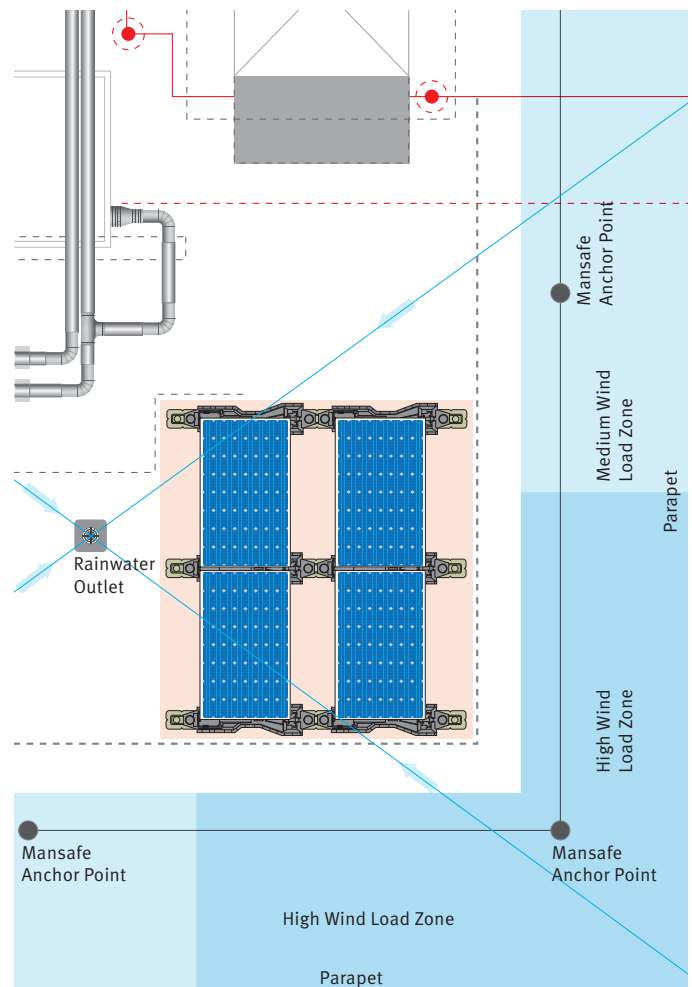
Our PV solutions are designed for the maximum number of modules to be installed on the identified roof area, maximising energy generation from the roof whilst respecting roof penetration and boundaries.

### Retrofitting PV

Retrofitting PV panels is possible on many existing buildings. The primary considerations are the additional weight loading; wind uplift factors that the PV array will impose; and what impact a retrofitted solar array may have on existing roof warranties.

Durability of the waterproofing system is also a key consideration as its remaining lifespan should, at a minimum, match that of the PV scheme, as well as be able to withstand any additional access requirements for maintenance.

The most popular Bauder system installed as a retrofit on refurbishment projects is the BauderSOLAR F system.





# BauderSOLAR F and BauderSOLAR F XL Systems

## Flat roof PV solutions for new build and retrofit projects

The mounting system is secured to the roof using membrane-to-membrane welding techniques on our bituminous and single ply waterproofing systems.

Our BauderSOLAR PV systems deliver energy generation solutions for both new build and retrofit projects.

A distinctive element of our lightweight PV mounting system is the prefabricated Bauder membrane sleeve which slips over the mounting plates and is welded into position, anchoring the plates to the surface of the Bauder waterproofing system. Once this is completed, the rest of the solar PV installation is simply locked into place with a bayonet locking system.

### Plus points

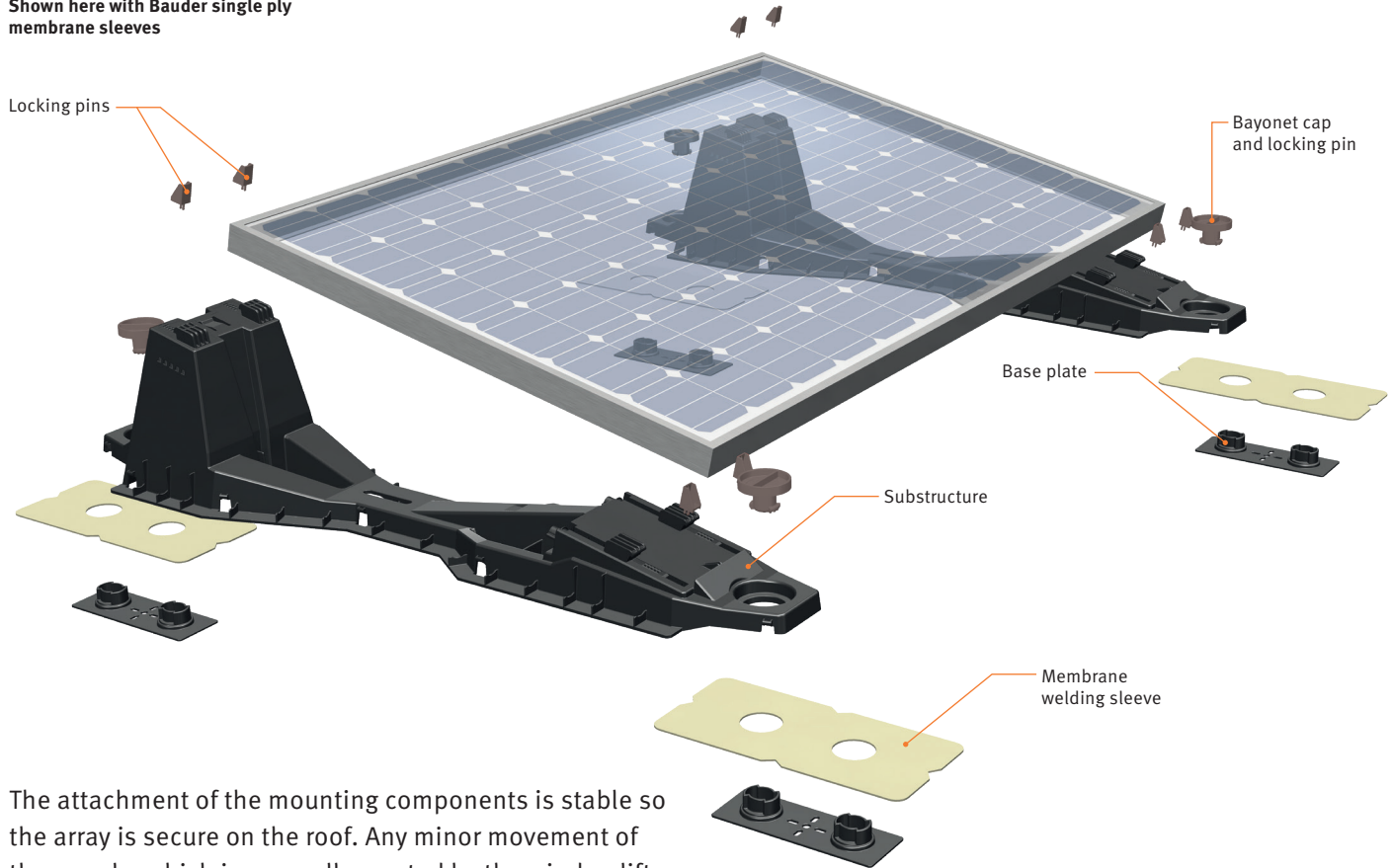
- Penetration and ballast-free installation method reduces risk
- Compact module pitch allows for efficient use of roof space, increasing the potential energy output
- CCPI-assessed waterproofing and mounting system data
- BauderSOLAR F XL single mount weight is 4.8 kg/unit
- Single source for design of waterproofing and solar PV array with clear accountability
- Bespoke range of guarantee packages to fulfil cover requirements for the project (dependant on system/product selection); for more information, contact our technical department for a sample guarantee outlining cover level, terms, and conditions





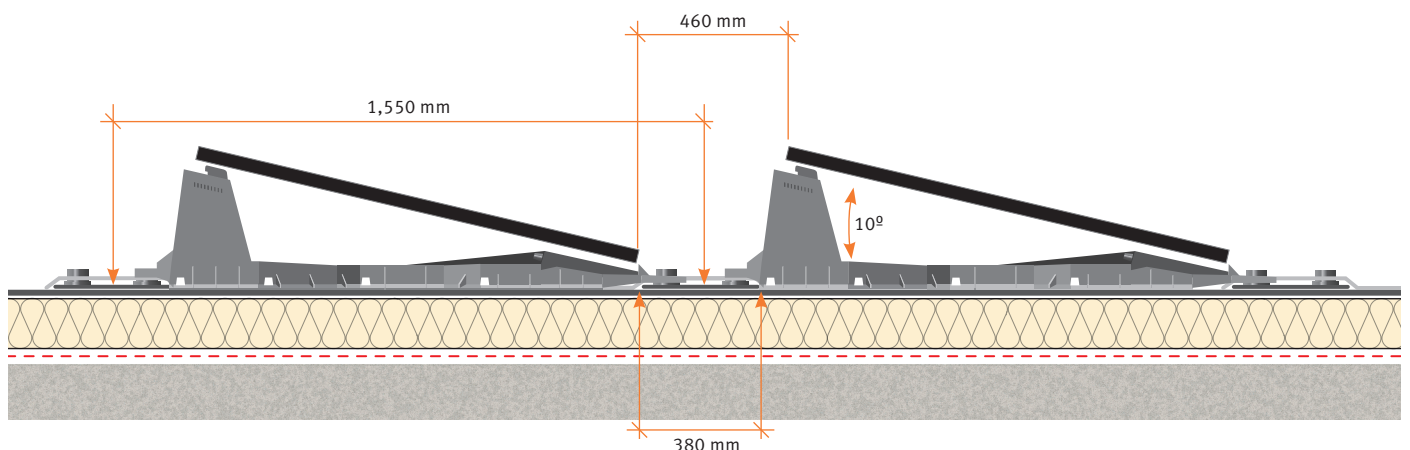
# BauderSOLAR F and BauderSOLAR F XL Systems

Shown here with Bauder single ply membrane sleeves



The attachment of the mounting components is stable so the array is secure on the roof. Any minor movement of the panels, which is generally created by the wind uplift, is tolerated and has minimal affect on the fixings or waterproofing system.

Dimensions shown are for BauderSOLAR F XL mounting system.





# BauderSOLAR G LIGHT System

## Biosolar PV solution for green, or blue, roofs with substrate based biodiverse and extensive vegetation

This is a unified solution for mounting solar PV arrays where the substrate and biodiverse vegetation provide the ballast to secure the array for new build and retrofit projects.

BauderSOLAR G LIGHT system allows the entire roof area to qualify as a biodiverse green roof to meet planning, biodiversity net gain, and BREEAM requirements. Additionally, the biosolar system can increase the efficiency of the array because the vegetation preserves ambient rooftop temperatures, helping to keep solar modules closer to optimal output.

### Supporting flora and fauna

The panels create a mixture of sunny, shaded, and sheltered zones to give a matrix of different habitats for a broader range of vegetation, whilst providing refuge areas for small invertebrates from inclement weather.

The BauderFLORA 3 seed mix is a specific blend of low-growing and shade-tolerant native plants. Plug plants can be used where specific species are required. Vegetation blankets provide instant coverage between the panels and stabilisation of the substrate in exposed locations.

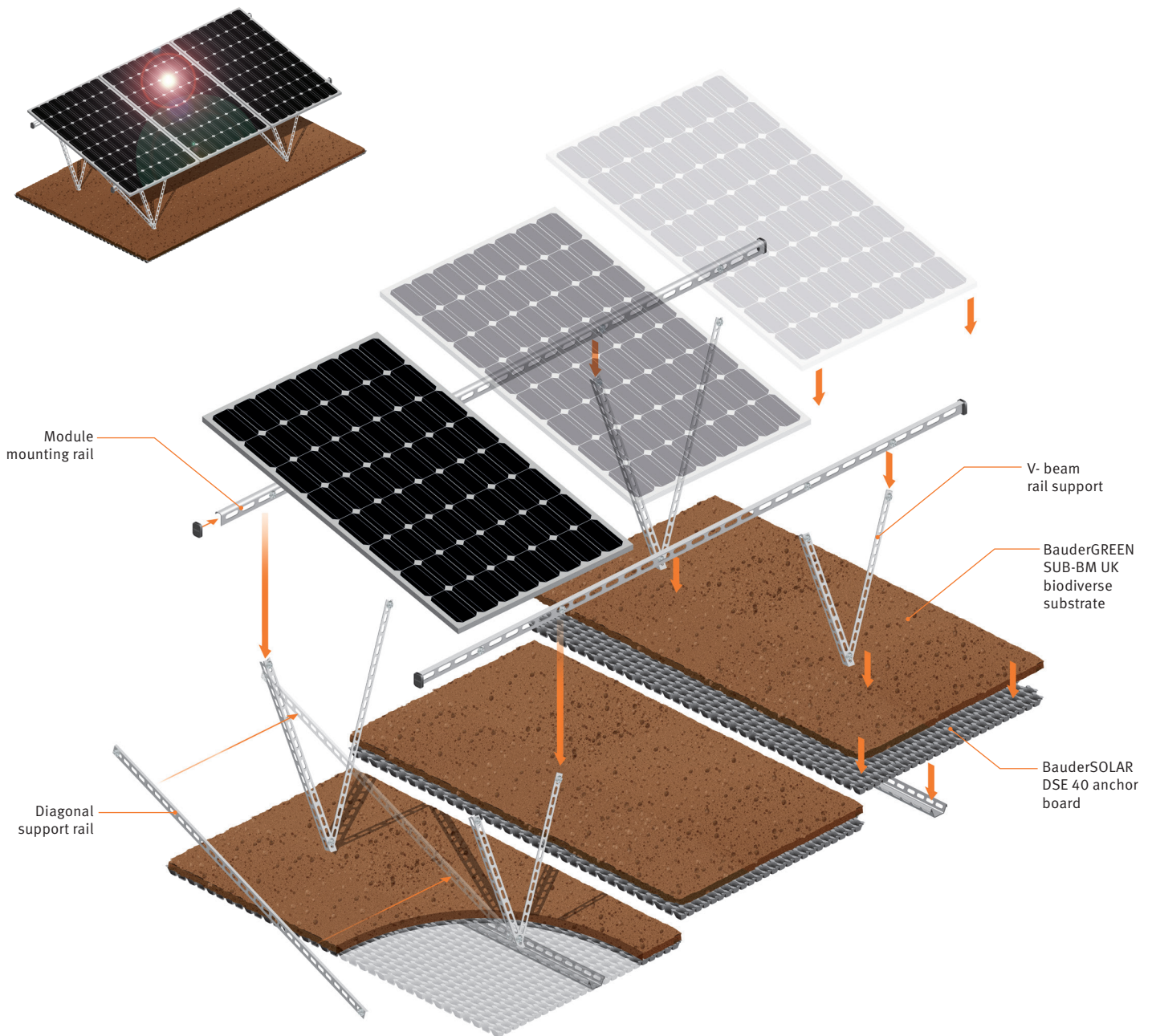
### Plus points

- Raised modules allowing light and moisture under the panels and the creation of varied habitats supporting a greater range of plant species and small invertebrates
- CCPI-assessed waterproofing and mounting system data
- Single-point responsibility for the waterproofing, green roof and PV mounting installation
- Bespoke range of guarantee packages to fulfil cover requirements for the project (dependant on system/product selection); for more information, contact our technical department for a sample guarantee outlining cover level, terms, and conditions

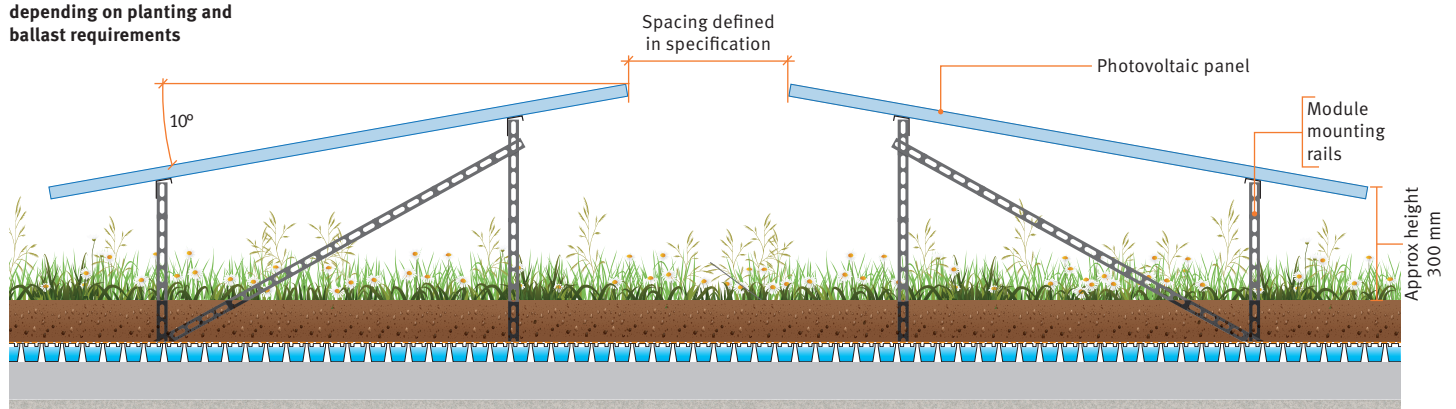




# BauderSOLAR G LIGHT System



Substrate depth variable depending on planting and ballast requirements





# BauderSOLAR G LIGHT with a Blue Roof Solution

## Incorporating a rooftop Sustainable urban Drainage System (SuDS) to attenuate stormwater on a flat roof for up to 48 hours

When integrated with the BauderBLUE STORMcell system, heavy rainfall drains into the attenuating cavity and is restricted at the outlet, helping to meet defined discharge rates for the site.

The BauderSOLAR G LIGHT is combined with the BauderBLUE STORMcell blue roof system that creates a void space beneath the green roof components and uses a BauderBLUE ST adjustable outlet flow restrictor to limit rainwater leaving the roof via the drainage system.

The BauderGREEN RWR 100 creates the void space and is manufactured to achieve >95% cavity. The green roof components installed atop the RWR 100 also contribute to water storage for SuDS and support the vegetation.

### Plus points

- Maximises environmental opportunities for the flat roof
- Attenuates precise volumes of rainwater
- Depth of substrate to meet needs of the vegetation
- CCPI-assessed waterproofing and mounting system data
- Full design support and blue roof calculations to meet discharge rates for the site
- Bespoke range of guarantee packages to suit project and cover requirements, and comply with client's insurance company requirements

### Vegetation options

- BauderGREEN WB native species wildflower blanket
- BauderGREEN Plugs
- BauderGREEN Flora 3 biosolar and shade-tolerant seed mix



BauderBLUE ST adjustable blue roof outlet flow restrictor





Department of Engineering,  
University of Cambridge

**BUILDING BOARD**

Roof Size:	1,610 m <sup>2</sup>
Waterproofing:	Bauder Total Green Roof System
Specifier:	R H Partnership Architects
Main Contractor:	SDC Limited
Approved Contractor:	Voland Roofing



# Waterproofing the Roof for the PV Array

## Ensuring the PV array is secure and the building is watertight

The waterproofing system is a key element in the success of the solar PV array, and specific systems from our portfolio are suited to the different solar solutions.

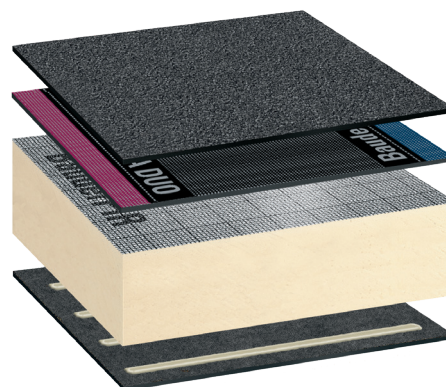
Your Bauder area technical manager will work with you to select the right Bauder waterproofing system for the type of solar PV system being specified on each roof area.

When the BauderSOLAR G LIGHT system is specified, a root-resistant cap sheet is used.

### Reinforced bitumen membrane systems

Noted for their lifespan and ability to sustain foot traffic as well as loads associated with the installation and maintenance of a solar, biosolar green, or blue roof.

- BauderSOLAR F • BauderSOLAR F XL
- BauderSOLAR G LIGHT
- BauderSOLAR G LIGHT with BauderBLUE STORMcell

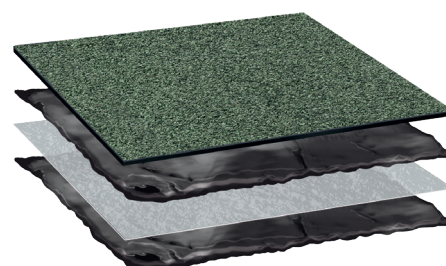


Reinforced bitumen membrane system

### Hot melt structural waterproofing

Specified primarily for new build construction of protected, inverted, or buried roofs such as podiums and plazas.

- BauderSOLAR G LIGHT
- BauderSOLAR G LIGHT with BauderBLUE STORMcell

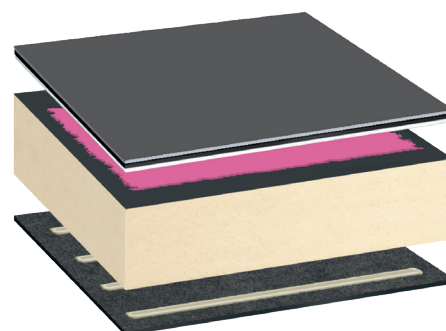


Hot melt

### Single ply system

Optimal when a lightweight solution is required on new build and refurbishment projects.

- BauderSOLAR F • BauderSOLAR F XL



Single ply system



# Technical Support Service for Roofs with a Solar PV System

## Supporting you in the design of a PV solution to meet project requirements and budget

Our technical managers play a vital role in the success of every project, from conceptual stage to the hand-over and sign-off of the Bauder installation. Our system information is CCPI-assessed to provide unambiguous and accurate information to specifiers.

We assist you with the design of the detailing, writing the specification for the flat roof solution, and recommending suitable approved contractors to tender for the project. This service is without charge, and we work with you to ensure your roof specification meets all your needs.

### Working with you to understand

- ▣ Drivers for solar PV installation
- ▣ Building's energy consumption
- ▣ Useable non-shaded roof space
- ▣ Budget
- ▣ Waterproofing system requirements
- ▣ Funding opportunities available
- ▣ Meeting any planning constraints
- ▣ Energy generation requirements

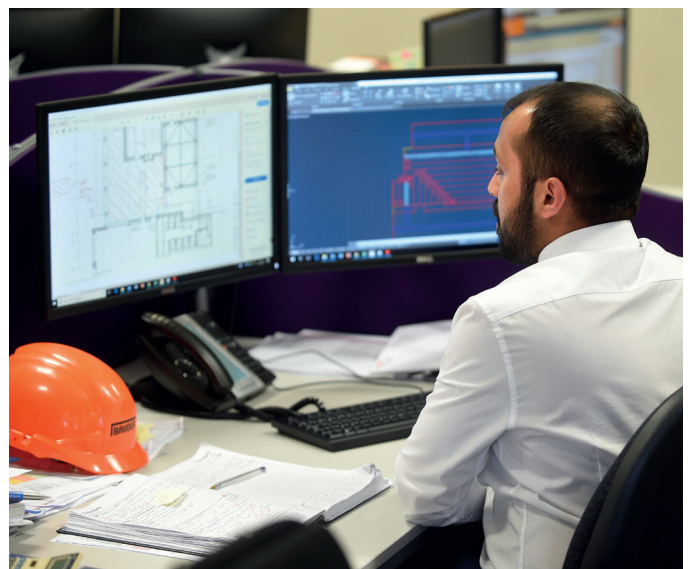
### Our service to you delivers

- ▣ Detailed PV specification package
- ▣ Proposed waterproofing system
- ▣ Array layout roof plan
- ▣ Number of panels and orientation
- ▣ System output
- ▣ Carbon savings
- ▣ Wind load calculations
- ▣ Electrical design and inverter sizing
- ▣ Budget costing
- ▣ Green or blue roof integration and vegetation scheme for BauderSOLAR G LIGHT system
- ▣ Bespoke range of guarantee packages to suit project and cover requirements

### Our installations

Bauder-approved contractors deliver the installation of our roofing systems and they receive the support and expert advice they need to ensure a high-quality roof solution.

Once your roofing works commence, our experienced team of site technicians will monitor and inspect the workmanship to ensure that our standards are fulfilled.





# Project Studies

## Sybil Andrews Academy, Suffolk

BauderSOLAR F

Sybil Andrews Academy was designed so that the building can be adapted as the academy grows. Working closely with the architect and client, Bauder developed a bespoke specification package to maximise the solar output from the available roof space and satisfy all relevant local planning conditions.

### Advocacy

**Paul Denton, Concertus Design and Property**

**Consultants:** *“Bauder’s comprehensive system portfolio of waterproofing and solar solutions made the specifications straightforward as we were able to select an integrated solution delivered from a single-source supplier.”*

### System summary

**Solar PV**

BauderSOLAR F

**Waterproofing**

Bauderflex RBM system



#### BUILDING BOARD

Roof Size:	5,000 m <sup>2</sup>
PV Scheme:	313 modules; 74.32 MWh
Client:	Suffolk County Council
Specifier:	Concertus Design and Property Consultants
Approved Contractor:	GRM Roofing
PV Installer:	Chelsfield Solar

## University of the West England, Bristol

BauderSOLAR F

UWE quadrupled its solar generating capacity through the installation of 1,731 solar panels during roof refurbishment, enabling it to produce over 400 MWh of electricity each year, making it the largest solar panel array in the UK university sector at the time of installation.

### Advocacy

**Fabia Jeddere-Fisher, Energy Engineer at UWE:** *“The system we chose means the panels are welded into place, reducing load, and the need for roof penetrations and thereby risk of leaks. The University will use 100% of the power generated. As a large organisation we want to set an example for others to undertake similar projects.”*

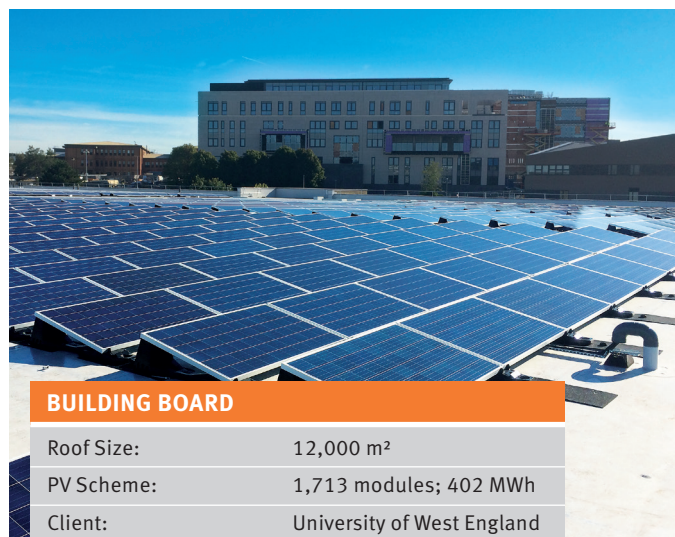
### System summary

**Solar PV**

BauderSOLAR F

**Waterproofing**

Bauder Thermofol System



#### BUILDING BOARD

Roof Size:	12,000 m <sup>2</sup>
PV Scheme:	1,713 modules; 402 MWh
Client:	University of West England
Specifier:	Parsons Brinckerhoff
Approved Contractor:	Mitie Tilley Roofing
PV Installer:	Dulas



# Project Study

## Department of Engineering, University of Cambridge

### BauderSOLAR G LIGHT with BauderBLUE STORMcell

This new build project in the centre of Cambridge combines a Sustainable urban Drainage Solution (SuDS) with vegetation and renewable energy in a warm roof construction.

#### Synopsis

The client identified sustainability as being a key driver in the design of the roof, and sought a single-source supplier that could provide a guarantee for both workmanship and products. The Bauder team created the solution bringing together the entire roof requirement for a single guarantee.

#### The challenge

The roof deck was constructed using a pretensioned concrete plank roof structure. Due to the large span of these planks, the dead load weight to the roof was restricted requiring a measured approach to the design of the solar PV, green roof, and blue roof.

To achieve the flat deck, with no backfalls, the final deflection of the fully loaded roof was calculated and the concrete deck screeded to give a flat finish.

#### System summary

<b>Solar PV</b>	BauderSOLAR G LIGHT
<b>Waterproofing</b>	Bauder Total Green Roof System
<b>Green roof</b>	Bauder biodiverse substrate with native species
<b>Blue roof</b>	BauderBLUE STORMcell

#### Highlights

- Deck deflection calculation and screed finish ensured compliance to BS 6229:2018
- Warm roof construction with 160 mm BauderPIR FA-TE insulation
- Unified approach to the design of the solution
- Full Bauder support for technical advice, design, installation monitoring, and inspections



#### BUILDING BOARD

Roof Size:	1,610 m <sup>2</sup>
PV Scheme:	40 modules; 9.91 MWh
Specifier:	RH Partnership Architects
Approved Contractor:	Voland Roofing
Main Contractor:	SDC Limited
PV Installer:	Voland Limited



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### Reducing use of materials



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