Schedule of Works/ Installation Guide

Installation of a Domestic roof mounted

Solar PV System.

Poplar House
Madeira Hill
Wrexham
LL13 7HD

Installation Guide

Impact on the Asset

The impact to the listed asset as a whole will be minimal, including all electrical work. Cable runs for electrics will follow existing cables to minimise any impact to the historic fabric, same follows with work to the roof, roof hooks will attach to roof rafters with this being the only contact with the listed asset.

Justification for Works to or close to a Listed Building

Listed Buildings are generally older properties that, although of sound construction, are significantly less energy efficient than modern properties.

This proposed 1 Day installation will ensure that Poplar House becomes more sustainable and more energy efficient.

The proposed installation of solar photovoltaic panels has been carefully designed to support the long-term sustainable use and viability of the listed building while preserving its special architectural and historic interest. The scheme contributes to reducing the building's carbon emissions, improving energy efficiency, and supporting national and local objectives relating to climate change mitigation and the transition to renewable energy.
The location, scale, and appearance of the panels have been selected to minimise visual impact on the building's heritage significance. The installation will not require the removal of historic fabric beyond that necessary for fixing and cabling. The intervention is reversible, allowing the panels to be removed in the future without causing permanent harm to the historic structure.
In accordance with heritage policy, the proposal has sought to achieve a sensitive balance between conserving the building's significance and securing environmental improvements necessary for its continued sustainable use. Any limited impact on the character or appearance of the listed building is considered to be less than substantial and is outweighed by the public benefits arising from renewable energy generation, reduced operational carbon emissions, and the enhanced long-term sustainability of the asset.
The proposal therefore represents a proportionate and sympathetic adaptation that enables the listed building to meet contemporary environmental challenges while safeguarding its heritage value for future generations.

Installation Guide

Roof Anchors

Roof anchors are aluminium or steel components that screw directly into the rafters, forming the base of the mounting system. The type of anchor used is determined by the characteristics of the existing roof tiles and the height and spacing of the roof batons. The majority of the anchor fits under the tiles with only a small proportion of its tail visible. It is to this tail that the frame is attached.





Mounting Systems

Once the roof anchors are secured in place the frame is attached to them. This attachment is made using a specially engineered locking system to ensure there is no movement and then tightened using conventional bolts. The frame consists of two parallel aluminium bars for each row of panels. The panels sit directly on the frame and attached by clamps. There are two varieties of clamp; end-clamps and mid-clamps. End-clamps are situated at the end of a row of panels, thereby helping to secure one panel. Mid-clamps are used between panels to help secure two panels in place and ensure there is equal spacing between them (usually 20mm) for aesthetic reasons. At least 4 clamps are used to secure each solar panel to the mounting frame, with different clamps being used for each brand of solar panel.

The Solar PV Installation

Now that the components required for the installation have been laid out, the installation process itself can begin. Roofs are very rarely exactly 'straight'. Inevitably the ridge, the eaves and the ground will not run perfectly parallel to each other. The installation looks best when the panels run parallel to the edge that is nearest them, which is usually the eaves. We recognise that after performance, aesthetics are the most important aspect of a solar photovoltaic installation and so our installation teams will ensure this to be the case.

We will arrange to have scaffold erected by locally sourced trained specialists. Depending on the expected length of the job this will either happen before or during the morning of the first working day. The scaffold is erected to reach the eaves of the roof and ensures the safety of those working on the roof with compliance to all relevant Health and Safety codes. Ladders from the scaffold across the roof are used when the roof tiles are slippery or fragile.

Positioning the Roof Anchors

It is important that the roof anchors are positioned carefully on the roof to ensure the solar panels can be installed correctly. The location of the rafters under the existing roof tiles are identified, to which the roof anchors will soon be screwed. The anchors are then placed on top of the tiles where they will eventually be positioned while measurements are taken to ensure that the aluminium frame will sit 'straight'.

Once the position of the anchors is determined they can be fixed to the roof. One roof tile is removed to allow the anchor to be screwed to the rafter and then replaced to ensure the roof remains watertight. It is important that the correct type of anchor is used and this would be determined during the site survey.

Once all the roof anchors are fixed into place, the aluminium bars that make up the frame are then locked into the anchors and screwed into place. Each bar is checked to make sure that it is straight and that all the bars are parallel to each other. This is the single most important step in ensuring that the panels will look correct.
If the length of the frame is longer than the aluminium bars supplied then they are spliced together using specially designed strips of aluminium and further bolts.

Installing The Solar PV Panels

With the bars in place, the frame is complete and the panels can start to be attached and clamped to the frame. A minimum of 4 clamps is used per solar panel, though in some cases extra clamps are used to aid the parallel alignment of the rows.
The panels are either placed by row or by column depending upon which is the easiest in each specific situation. In the photo to the right the panels are being placed by row. In this case the top row is placed and the alignment of each row thereafter is taken from it.

Wiring The Panels

The solar panels are wired by the manufacturer, meaning the rooftop connection is straightforward. The specific voltage, amperage and power of the system determine how the panels are connected. Smaller systems connect a single series to a single inverter, while larger systems connect several parallel series into a single inverter. The largest systems may require multiple series into multiple inverters. Shading and panel positioning can also influence the design of the wiring.

Installing the Final PV Panel

Once the top row of solar panels is correctly clamped the rows beneath are secured to the frame in the same manner, taking their positioning from the row above. Aligning the panels parallel to the row above is extremely important in ensuring the finished system will look good. This process is made easier if the original frame is well placed, which is why our installers take care to get things right within the initial stages of the installation. Once all the panels have been installed and the alignment checked the final wiring of the system can begin. The DC wiring from the panels on the roof needs to enter the property in order to be connected to the electrics in your home. In some cases this is achieved by running the wire under the eaves and directly into the loft. In others, a hole is made within the wall which is then sealed to ensure it is watertight. Once the wiring has reached the inside of the property, the rooftop section of the installation is complete

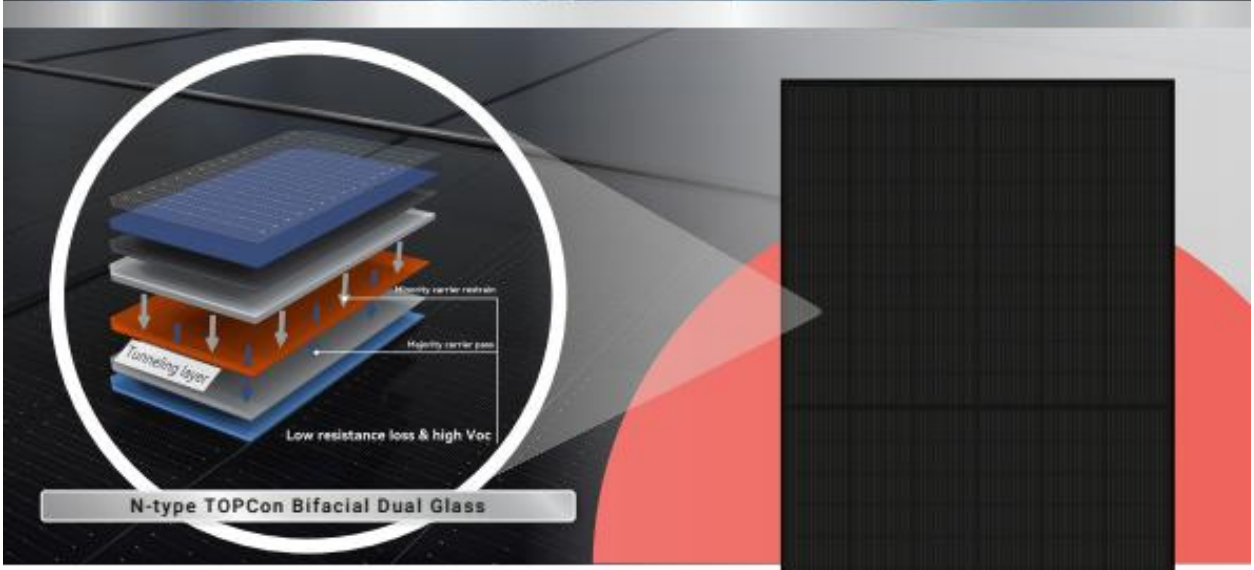
Solar Panel Data Sheet

Evolution MAX 500W

EVO-500DH8N-120 Series

Monocrystalline Module

Project Solar UK



25.79%
MAX MODULE EFFICIENCY AFTER INSTALLED

99
YEARS LIMITED PRODUCT WARRANTY

230%
LONGER PERFORMANCE WARRANTY*

*Our panels performance warranty is 230% longer than our competitors, the market average warranty is 30 years.

Key Benefits

High Power Output
- Better light trapping and current collection to improve module power output and reliability.
- Bifacial performance, 25% max module efficiency according to BSTC, bifaciality 80±5%.

Outstanding Low Light Performance
- Higher power output even under low-light environments like on cloudy or foggy days.

Low LID (Light Induced Degradation)
- Low LID naturally which can increase power generation.

Better Temperature Coefficient
- Higher power generation under working conditions, thanks to passivating contact cell technology.

PID Resistance (Potential-Induced Degradation)
- Excellent Anti-PID performance guarantee via optimised mass-production process and materials control.

Enhanced Mechanical Load
- Mechanical performance up to 5400 Pa positive load and 4000 Pa negative load.

Sustainable Product
- High percentage of recyclable materials.

Insurance PICC ecovadis Sedex

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*V1.2. Information correct as of 05/25 - contents can be subject to change without prior notice.

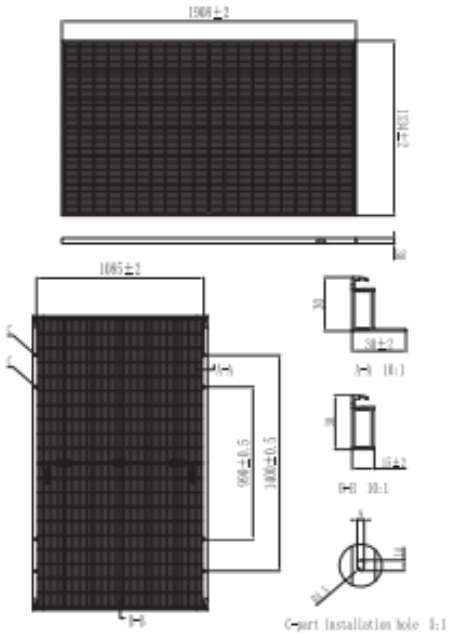
Solar Panel Data Sheet

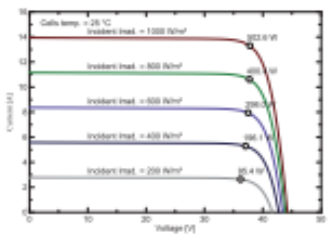
Evolution MAX 500W

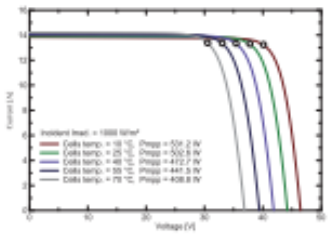
EVO-500DH8N-120 Series

Monocrystalline Module

Project Solar UK







Electrical Properties (STC)

Power Output (Wp)	500
Voltage Mpp-Vmpp (V)	37.14
Current Mpp-Impp (A)	13.48
Voltage Open Circuit-Voc (V)	44.22
Short Circuit Current-Isc (A)	13.94
Module Efficiency (%)	23.10%

STC: Irradiance 1000W/m², Cell Temperature 25°C, AM 1.5

Electrical Properties (NOCT)

Power Output (Wp)	378.5
Voltage Mpp-Vmpp (V)	35.77
Current Mpp-Impp (A)	10.59
Voltage Open Circuit-Voc (V)	42.04
Short Circuit Current-Isc (A)	10.97

NOCT: Irradiance 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s

Electrical Properties (BSTC)

Power Output (Wp)	552.2
Voltage Mpp-Vmpp (V)	37.14
Current Mpp-Impp (A)	14.87
Voltage Open Circuit-Voc (V)	44.22
Short Circuit Current-Isc (A)	15.38
Module Efficiency (%)	25.52%

BSTC: Front side irradiation 1000W/m², back side reflection irradiation 135W/m², AM=1.5,ambient temperature 25°C.

Mechanical Properties

Cells	N Type Monocrystalline Cell
Number Of Cells	120 [2× (10×6)]
Module Dimension	1908×1134×30mm(L×W×H)
Weight	27.2Kg±3%
Front Glass	2.0mm High Transmittance, AR Tempered Glass
Rear Glass	Black Grid 2.0mm Semi-tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP 68 (3 Diodes)
Cabel Length	TUV 1×4.0 mm², (+):1200mm/(-): 1200mm or Customised Length
Connector	Stäubli MC4 EVO 2A

Operating Properties

Operating Temperature	-40℃ ~ +85℃
Maximum System Voltage	1500V DC (IEC)
Maximum Series Fuse Rating	30A
Power Tolerance	±5%
Bifaciality	80±5%

Packaging Configuration

Packing Type	40'HQ
Piece / Pallet	36
Piece / Container	864

Temperature Coefficient

Temperature Coefficient Of Pmax	-0.30%/℃
Temperature Coefficient Of Voc	-0.25%/℃
Temperature Coefficient Of Isc	+0.046%/℃
Nominal Operating Cell Temperature (NOCT)	45±2℃