

INSTALLATION MANUAL
Volt[®]
PHOTOVOLTAIC SOLAR SYSTEM



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CUTTING EDGE INNOVATION



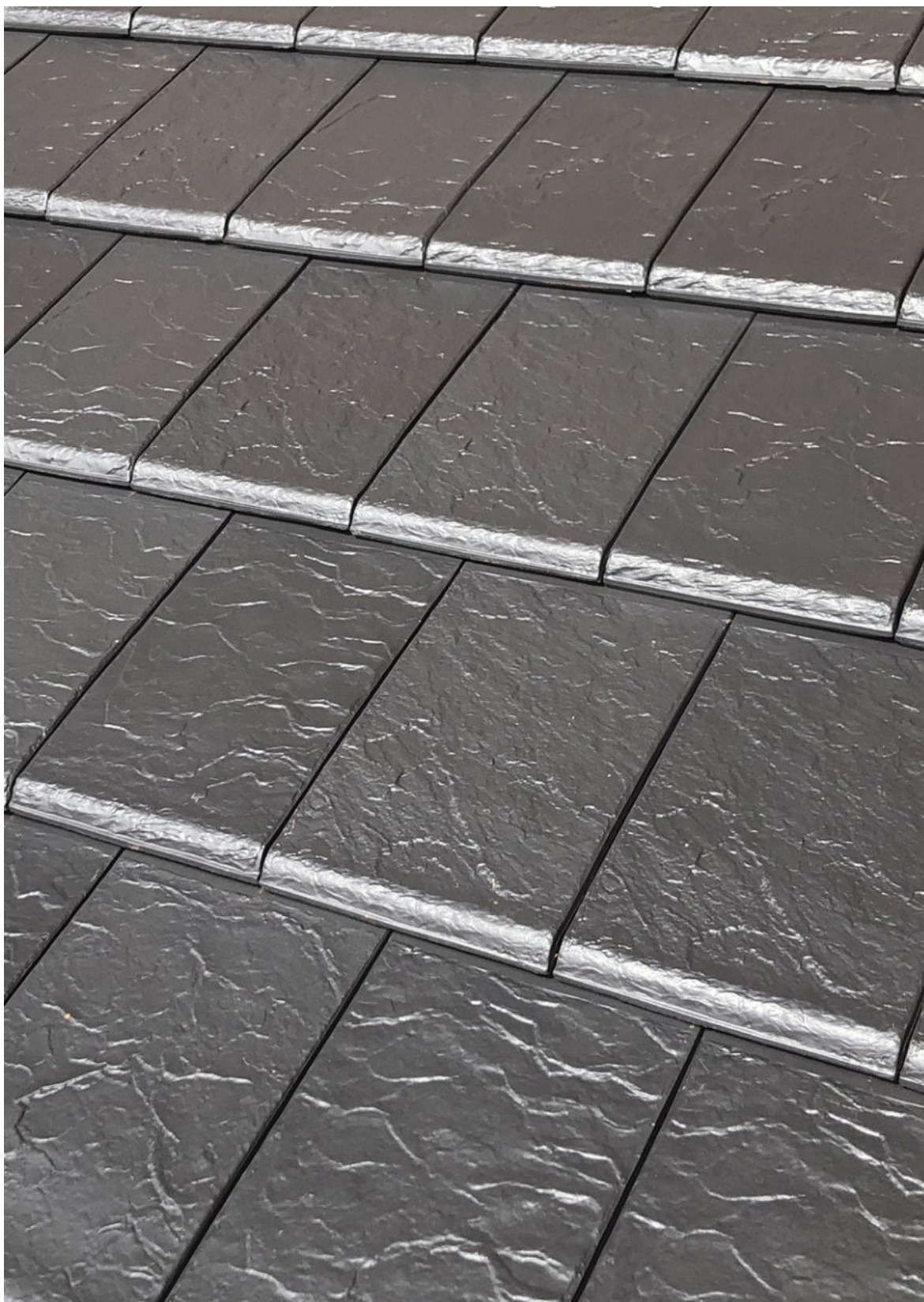


Perfectly Integrated **Volt Solar roof tiles**

Our aim is to offer cutting edge technology solar energy tiles that are also aesthetically appealing to the eye. Hard work and innovation have allowed La Escandella to position itself as one of the leading R&D and innovation groups within its sector.

We offer a wide range of tiles and special pieces which cater to any construction need.

Our clients are our priority, this is why we offer personalized assistance tailored to the client's needs. At La Escandella, the future is being manufactured now.



PLANUM
Roof Tile



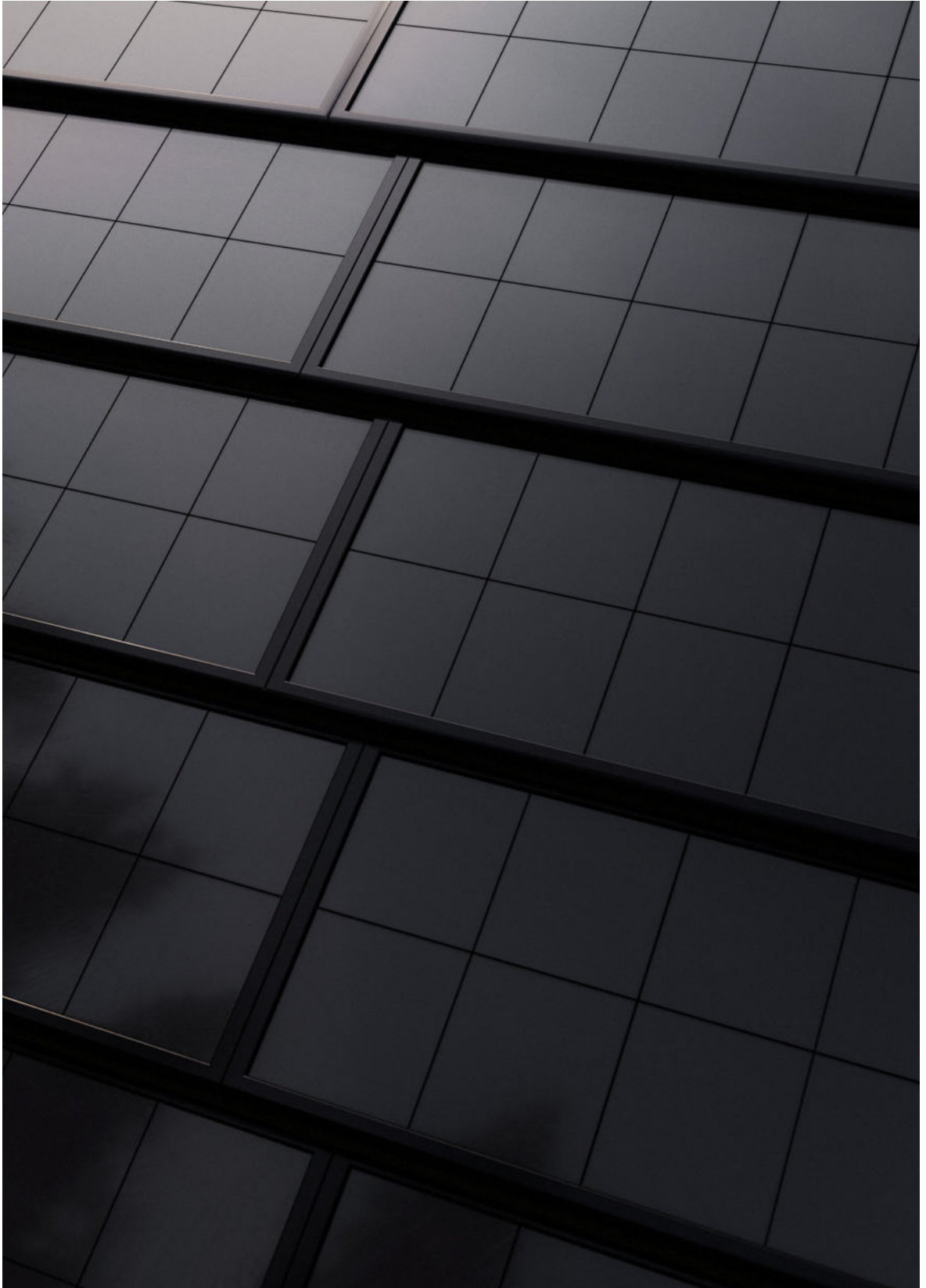
TECHNICAL CHARACTERISTICS

Dimensions*	A 441 mm / 17.36"
	B 278 mm / 10.94"
	C 32 mm / 1.26"
Pieces per m ² / sq.	11 / 101
Weight per piece	3.5 kg / 7.71 lbs
Longitudinal fit**	370 mm (+6 mm; - 44 mm) / 14.57" (+0.24"; -1.7")
Transversal fit**	237 mm / 9.33"
Units per pallet	240 / 320
Weight per pallet	840 kg / 1.852 lbs (240 pieces) // 1.120 kg / 2.469,2 lbs (320 pieces)
Laying	Broken bond

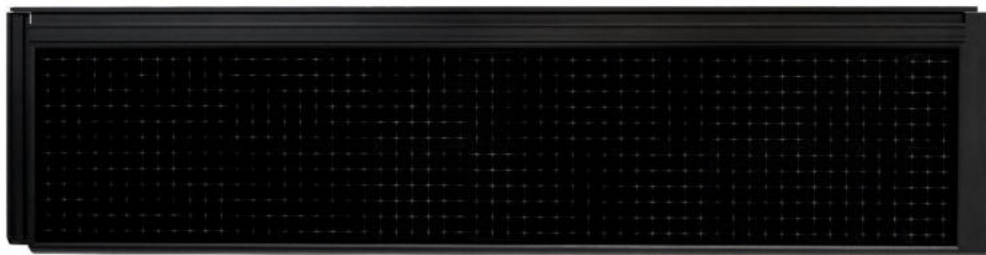
* The tile dimensions indicated in this chart, allow a tolerance of approximately $\pm 2\%$.

** Theoretic value: this should be re-calculated on site with the tiles that are to be used.





Volt[•]
Photovoltaic Solar System



38 Mono PERC Cells
115W Energy generated
18.8% Maximum efficiency
0~+3% Output range

Components: High efficiency mono-PERC cell. The tile can maximize its power output even in weak sunlight.

Toughened glass: Anti-reflective coating and Metal Wrap Through (MWT) increase power output and the mechanical resistance of the tile.

EVA, TPT and Al: High quality EVA and TPT materials, precise aluminium extrusions along with unique tile interlocking features protect the tile from breakage and water leaks and ensure an accurate installation, thus resulting in better reliability and a more durable product.

Electrical distribution box: The connection box is completely protected and waterproofed to withstand adverse weather conditions such as strong winds, hail and humidity. International certification issued by: ISO Quality management System, CE, TUV (IEC61215 and IEC61730).

TECHNICAL FEATURES

Dimensions	A 1723 mm / 67.83" B 445 mm / 17.52" C 54 mm / 2.13"
Pieces per m ²	1.3
Equivalancy of Planum	7
Volt photovoltaic solar tile weight	10 kg / 22 lbs
N° of mono PERC cells	38
Cell size	166 x 83 mm / 6.54" x 3.27"
Laying	Broken bond

PACKAGING FEATURES

Number of tiles per box	28
N° of boxes per container 40HC	48
Size of box	A 1450 mm / 57.10" B 900 mm / 35.43" C 560 mm / 22.05"
Weight of box	290 kg / 639.34 lbs

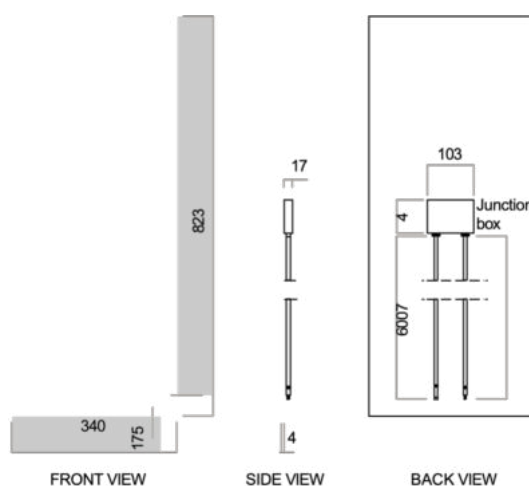
HEAT TRANSFER COEFFICIENT

Power Tolerance	0~+3%
Temperature Coefficient of Pmax	[-0.36 % / °C]
Temperature Coefficient of Voc	[-0.28 % / °C]
Temperature Coefficient of Isc	[0.06 % / °C]
NOTC [°C]	[43 ± 2] °C

MANUFACTURING MATERIALS

Front Glass	3.2 mm, Low Iron, tempered Glass
Junction Box	IP 65 Rated (Black)
Output Cables	TUV 1 X 4 mm ² , length: 600 / 700mm
Connector	- MC4 EV02
Encapsulation Material	EVA (0.45 ± 0,03 mm thickness)
Back Foil	Black TPT (0.32 ± 0.03 mm thickness)
Fixing Adhesive	Silicone Sealant (Black)

DIAGRAM OF PHOTOVOLTAIC UNIT (WITHOUT FRAME)



OPERATING CONDITIONS

TMax. system voltage	1500 DVC (IEC)
Max. system fuse rating (A)	15
Operating temperature (°C)	-40 ~ 85

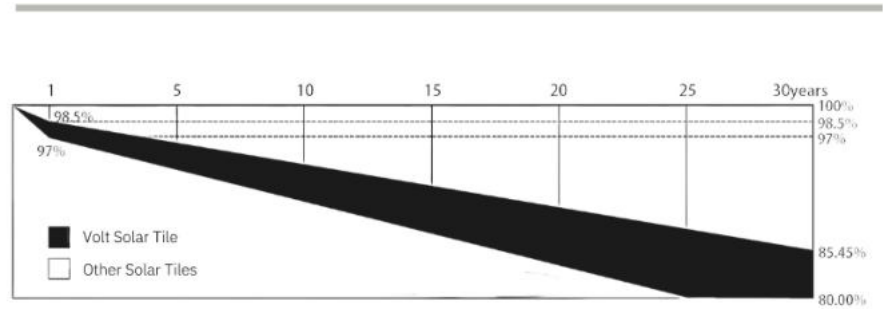
ELECTRICAL PARAMETERS IN STANDARD TESTING CONDITIONS (STC)

Module Type	VOLT115PLM38
Rated Maximum Power	115
Pmax/W Maximum Power	10.8 Vmp/V
Open-circuit Voltage	13 Voc/V
Maximum Power Current	10.7Imp/A
Short-circuit Current	11.3 Isc/A
Module Efficiency	18.8%

STC: Irradiance 1000W/m2 Module Temperature: 25°C AM=1.5

PERFORMANCE WARRANTY

LONG-LASTING RELIABILITY



CERTIFICATION



INTRODUCTION

La Escandella integrated systems for solar energy roof tiles complies with European photovoltaic manufacturing regulations. The system combines renewable energy with aesthetical integration. The solar unit is set in an anodized aluminium frame, using high efficiency solar cells as well as state of the art inverters and components.

Product details are provided separately and are subject to change without notice. This manual is to be read along with all the product details and specifications as well as the Planum H-Selection roof tile technical manual.

LIABILITY EXEMPTION

Installation, handling and use of the Volt Photovoltaic Solar System is sole responsibility of the electrician or qualified installer. La Escandella under no circumstances will be responsible for loss, damage, injury or expenses accrued from the undue installation, handling, use or maintenance of our solar tile products.

The design, installation and compliance of Volt Photovoltaic Solar System strictly adheres to European regulations and standards.

Please refer to the La Escandella roof tile instruction manual where you will find all the necessary information concerning the installation of the ceramic tiles. Both this manual and the Volt Photovoltaic Solar System installation manual must be read together.

SAFETY MEASURES

Health, safety and our environment are of the utmost importance to us. We are all responsible for:

- Preventing injuries and illnesses
- Reducing our carbon footprint
- Complying with all legal requirements

La Escandella makes it a priority to adhere to environmental, health and safety policies.

The Volt Photovoltaic Solar System can only be installed by electricians accredited by the Ministry of Industry.

Only contractors, electricians and/or qualified installers approved by La Escandella have authorization to access or to carry out work on the units.

Never stand on, damage or scratch the front or back surfaces of the units.

Broken units cannot be repaired and contact with any surface of a damaged unit may result in electrical shock. Do not use a unit in which the glass is broken or with a damaged backing or cables and connectors.

Do not dismantle or remove any parts from the units.

Do not use water to extinguish fires of an electrical origin.

Volt Solar Tiles are certified for operating in Class A installations at voltages below 1500Vdc. This maximum voltage should not be exceeded at any time and, allowance in calculations must include the temperature coefficient and voltage rise at temperatures below 25° Celsius as per AS5033.

Appropriate personal protective equipment (PPE) must always be used when handling electrical components.

Always ensure all MC4 connectors are clean and dry before connecting. Never disconnect on load connectors as this will cause an electric arc. Do not install or handle the units when they are wet or in strong winds.

Make sure all connections are properly carried out and there is no clearance between them. Clearance between connections may cause an electrical arc which may result in fire and/or electrical shock.

Make sure that the polarity of each unit or link is not inverted and take into account the remaining units or links.

Do not artificially magnify sunlight onto solar units.

Under normal operating conditions, a photovoltaic unit is likely to produce more current and/or voltage than that which is produced under standard testing conditions. Consequently, ISC values shown on this unit must be multiplied according to AS 5033.

Procedure for disconnection. Remember that the photovoltaic units will generate a potentially deadly DC current if they are exposed to any source of light. Extreme caution must be taken when working with photovoltaic units. The matrix isolator will not disconnect the units, it will only isolate the wiring in the matrix or the inverter.

Turn off the AC, (main alternate current switch) found on the switchboard. Turn off the DC switch found next to or integrated to the inverter. AC connectors or photovoltaic isolators must never be used on load.

Under no circumstances should anyone without the proper qualifications work on or with a photovoltaic system.

HAZARDOUS VOLTAGES

Please note that the photovoltaic modules will produce a DC voltage and current that can be fatal if exposed to any type of light source. Care must be taken when working on photovoltaic modules. The PV Array DC Isolator located at the inverter and the PV String Disconnection Point at the array will NOT turn the photovoltaic modules off; it will only isolate the array cabling between the PV Disconnection point and the inverter or between the inverter and the PV Array DC Isolator adjacent the inverter.

1. Turn off the AC "Solar Supply Main Switch" located in the switchboard.
2. Turn off the DC "PV Array Isolator" located next to or integrated with the inverter. Under no circumstances should the DC Connectors or PV Array Isolators be operated under load.

Never under any circumstances should an unqualified person work on a photovoltaic system. Only qualified and certified Electricians with Volt Solar Installer training are permitted to work on a Volt Solar Tile System.

GENERAL

- Potentially lethal DC voltages can be generated whenever PV modules are exposed to a light source. Avoid contact with electrically live parts, and be sure to isolate and test all circuits before attempting to make or break any connections.
- Only authorised Volt-trained personnel should have access to or perform work on the modules or solar system.
- Do not stand on, step on, damage or scratch the front or backside surfaces of the solar module.
- Broken modules cannot be repaired, and contact with any module surface can cause electrical shock. Do not use a module with broken glass or a damaged back sheet.
- Do not disassemble the modules or remove any part of the module.
- When working on electrical connections, all appropriate PPE should be worn.
- Ensure that all MC4 connectors are free from debris and moisture before connecting. Never disconnect any connectors under load.
- Ensure all MC4 connectors are of the same manufacture/make and are certified as compatible.
- Do not install or handle modules when wet or during periods of high wind.
- Ensure that all connections are securely made with no gap between the contacts. Any gap can result in electrical arcing that can cause a fire hazard and/or an electric shock.
- Make sure that the polarity of each module or string is not reversed, considering the rest of the modules or strings.
- Do not artificially concentrate sunlight on these solar modules.
- Volt Solar Tiles are certified for operating in Class A installations at voltages below 1500Vdc. This maximum voltage should not be exceeded at any time, and allowance in calculations must include the temperature coefficient and voltage rise at temperatures below 25° Celsius as per AS5033.
- Do not use water to extinguish fires of an electrical origin.
- Under normal conditions, a solar photovoltaic module will likely produce more current and /or voltage than reported under standard test conditions. Accordingly, the value of ISC marked on this module should be multiplied according to AS5033.

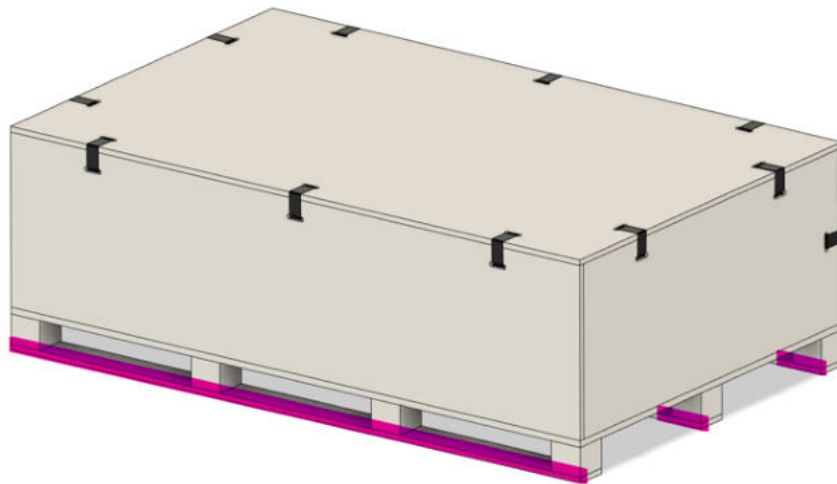
SOLAR TILE HANDLING

All Volt Solar Tiles should be handled with care at all times to avoid any damage. All warnings and instructions on the packaging should be observed. Follow these guidelines when unpacking, transporting, carrying, installing and/or storing solar tiles:

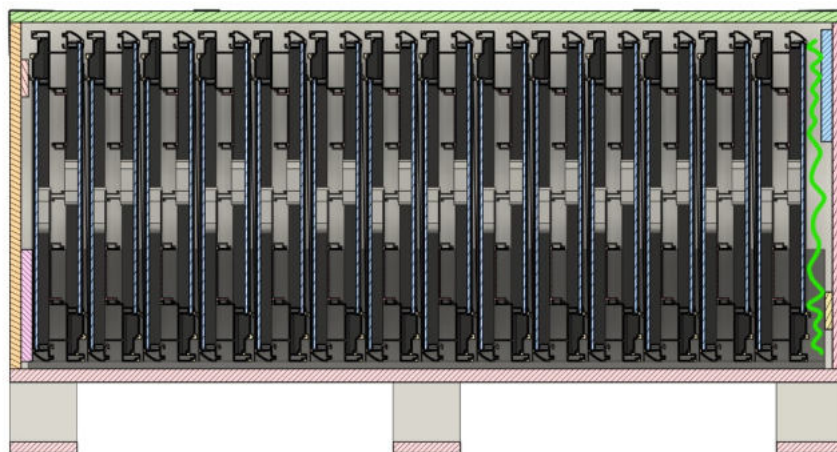
- Appropriate safety gloves must be used when handling solar tiles and/or packaging.
- Upon receipt of the solar tiles, the packaging should be checked for damage and any irregularities. If the packaging is damaged, all solar tiles should be checked, and a record should be made by photographing all affected components.
- Storage of packaging should be in a clean, dry place and only transported for the required time to get to the installation site. Limit exposure of packaging to weather elements. Under no circumstances should the packaging be allowed to get wet.
- Do not stack solar tile boxes.
- On-site, the modules need to be kept clean and dry. Do not unpack modules onto the ground.
- Record the serial numbers before installation and note the information in the system documentation.
- Do not use the junction box or cables as a grip when moving the solar tiles.
- Do not stand or walk on the solar tiles.
- Avoid dropping the solar tiles, as the damages caused may not be seen or apparent immediately.
- Keep all electrical contacts clean and dry.
- Do not apply force to the back sheet on the rear of the solar tile.
- Avoid using sharp or pointed objects if the solar tile or its components require marking.
- Do not use adhesives, detergents, or paints on the front or rear of the solar tile.
- Solar tiles that have been damaged or tampered with are not to be used in any way.
- Never attempt to disassemble, modify, or adapt the solar tile, back sheet, junction box, or frame in any way, as this will void the warranty.

PACKAGING

Photovoltaic units, isolators and other components are fragile and must be handled with care.



F1: View of the interior of a box. Each box contains 28 units.



- Packaging must be stored under special conditions. It must never be exposed to weather or allowed to be exposed to moisture.
- Volt Photovoltaic Tiles should not be piled up.
- Once on the building site, Volt Photovoltaic Tiles must be kept clean and dry.
- Special precautions should be taken when unpackaging the tiles.
- Each Planum Photovoltaic Tile has a unique serial number on the back and on the outside of the box, on the paper, as can be seen in the photograph. These numbers must be taken note of or photographed when unpackaging. The installer must keep a record of this serial number and the corresponding project.



DESIGN & INSTALLATION

The photovoltaic, electrical and structural design as well as wind resistance must be taken into account when designing an integrated solar energy system. The design of photovoltaic tiles and its components considers the following factors:

- a. Wind speed and local wind designations.
- b. Category of the terrain on the building site.
- c. Technical register 440 (TR440) code extension, which is believed to be the standard design for products in most cyclonic areas.
- d. State requirements and agreements according to current legislation.

For optimum resistance, the installation instructions are calculated on a basic wind speed of 60m/s, at a height of 6 metres from the ground.

We recommend consulting both La Escandella as well as a construction engineer with knowledge of area specifications, when installing in cyclonic designated areas.

La Escandella recommends installation specification requirements based on wind gust speed design as well as:

- a. Minimum roof gradient angle of 15°
- b. Maximum roof gradient angle requirements.
- c. Lath requirements, especially the spacing in the support framework.
- d. Installation requirements for horizontal and vertical laths.

PHOTOVOLTAIC DESIGN

La Escandella and the contractor approved by La Escandella will provide the photovoltaic and electrical designs for each project. The accredited installer must adhere to the designs provided and ensure that the designs comply with all the requirements set out in this manual and with the current Spanish and European legislation pertaining to photovoltaic systems.

ORIENTATION AND GRADIENT

The Volt Photovoltaic Solar Systems for La Escandella are designed for a gradient angle of 15° or more. The roof orientation must be facing south in the northern hemisphere and vice versa. Under no circumstance should it be installed at an inferior gradient angle unless specifically approved by La Escandella due to project specifications.

PLACEMENT OF THE PLANUM PHOTOVOLTAIC SYSTEM

The Matrix must be placed far from any shaded area. If for any reason the matrix is in the shade, a study of the shaded area and energy efficiency calculations should be made (including a monthly graph).

INVERTER AND PLACEMENT OF THE INVERTER

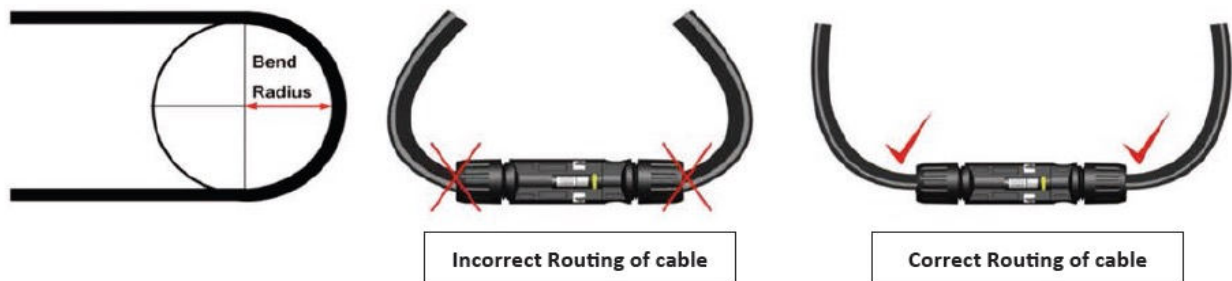
Recommendations:

- The inverter must be installed as close as possible to the main control unit or the meter panel in order to reduce AC wiring
- It should be placed, generally, under the eaves or as protected from direct sunlight as possible. If necessary, the AC isolator is best situated next to the inverter. The La Escandella Volt Photovoltaic Solar Systems must not be altered or augmented in any way without written consent from La Escandella.

DC WIRING

The DC wiring must not have a tension drop of more than 1%. It must be installed within the containment system of the tile frame using a flexible and resistant conduit (tube) that protects the wiring between rows of tiles. The DC wiring installed in the tile frame must adhere to the curvature radius specified by the manufacturer and according to that detailed below. It must never make contact with any adhesive.

Note: curvature radius of the wire shall not be inferior to 6 times the exterior diameter of the cable. All the wiring in the matrix or from the isolator to the inverter must be encased in the high resistance conduit. The wiring must be done when the solar unit frames are being installed.



DC WIRING – INSTALLATION METHOD

The Volt Photovoltaic Solar System wiring is contained within the wiring trays found on the back of the Planum solar tile.. According to the following method, the connection between a Planum tile in a link of solar tiles is done through an MC4 EVO2 connector which comes out of the wire containment tray and separates to the left and right of the containment tray.

The MC4 connectors are inserted into the wire containment tray, where they are connected. All wires and wiring containment must be kept at least 50mm away from any surface, for example:

The conduit for the matrix wire must be fixed to the lower part of the trusses. When the conduit for the solar tile wire is fixed to the wall, it must be at least 50mm beneath the surface of the wall or installed between the bricks and the wall frame. Note: the twin DC wire must never be separated and used as an individual DC wire. Doing so would imply the wiring insulation does not comply with the manufacturer's testing standards.

Inverted current safety/ segment fusion/ ranges.

In the matrix, segments must never be connected parallel to each other unless negative/positive pole segment fuses are used. The segment fuse can be installed in the inverter if necessary, but the design recommendation is to install each segment in order to separate the MPPT inverter entries (Monitoring maximum power).

DC LINKS, ELECTRICAL DESIGN AND INSTALLATION

The DC matrixes/links, the design and the installation must adhere to the design approved by La Escandella and which we provide with each specific project. The segment voltage varies depending on local weather conditions and must be designed to adapt to the characteristics of the inverter that has been chosen.

This allows for ideal minimum and maximum tension in VMP and VOC.



INSTALLATION

To carry out the installation correctly, it is necessary for the electrician to be on site with the panel installer. The installation and fixing of the ceramic tiles must be carried out according to the La Escandella tile installation manual.

The Volt Photovoltaic Solar System must be installed on a well-ventilated surface with primary and secondary laths.

La Escandella offers all the accessories for a perfectly ventilated roof with 360° Solutions La Escandella.

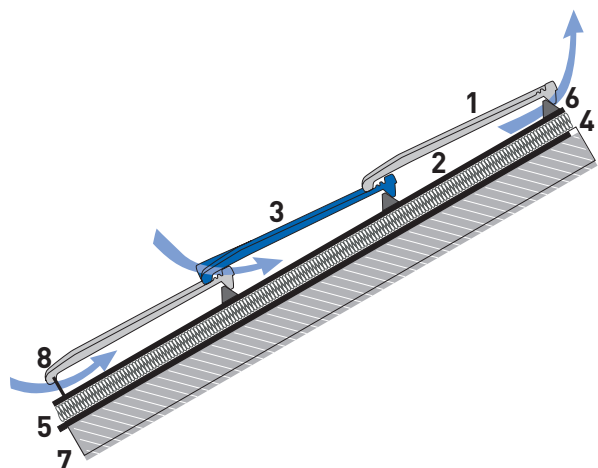
Panel requirements are:

- Water- repellent
- Thermal insulation (protects from heat and cold)
- Frost resistant
- Structural remittance
- Fire resistant
- Air (and steam) flow
- Insulation from noise
- Interior and exterior aesthetics that blend with the surroundings

This diagram shows correct airflow.

VENTILATED ROOF

1. Planum roof tile (TI)
2. Micro-ventilation void. The arrows show airflow for correct ventilation.
3. Ventilation roof tile
4. Rafter
5. Heat insulation underlayment
6. Waterproof underlayment material
7. Frame
8. Eaves ventilation comb / bird stop



MATERIALS NEEDED FOR VOLT PHOTOVOLTAIC SOLAR TILE INSTALLATION

		Product	Unit	+ info
Wooden battens or Metal battens	Screws	CAM77	4 units	
	Wooden battens	CAM92	2 units	35 x 35 mm
	Screws	CAM77	2 units	
	Metal battens	CAM050	2 units	
Volt Solar Tile		VOLT115PLM38	1 unit	
	Nº W/unit		115 W	
	Nº tiles/m²		1.3 units	Equal to 11 (TI)
	Nº W/m²		149.5 W	
Impermeabilización				
	Rafter	CAM55	1 unit	Available 135 and 150 gr/m²
	Insulation	CAI55	1 unit	Available from 30 to 80 mm
	Waterproof underlayment material	CAM52	1 unit	Available 115 - 180 gr/m²

SECURING WITH BATTENS

The ventilated roof must have double laths and a waterproof sheet with a minimum weight of 150gr/m² (CAM52) We recommend installing 30mm insulation minimum thickness beforehand (CAI55) and a steam lining of 135gr/m² (CAM55). Another option is installing Onduline DSR under tile coating.

For wooden and metal horizontal battens, a minimum height of 3.5cm is required. For vertical laths, 3.5cm is the requirement in compliance with the technical roofing code.

The battens must be spaced at 365mm top to top/centre to centre with zero deviation.

How the battens are secured will depend on the material they are made of.

Check La Escandella installation manual for more information.

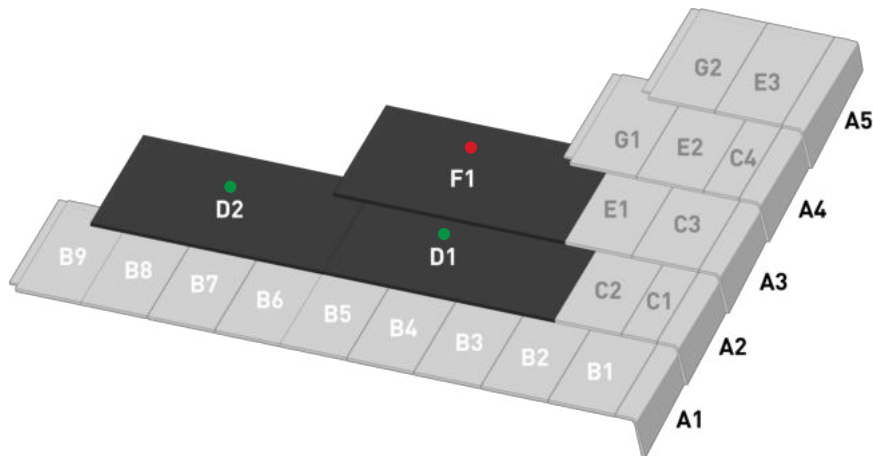
MOUNTING THE ROOF

The Volt Photovoltaic Solar System is to be installed according to the standard technical installation manual for Planum H-Selection roof tile, whilst taking care to ensure the interlock on the underside of the nose of the Volt Photovoltaic solar tile has correctly seated into the receiver on the upper edge of the planum solar tile below (see page 32). The Volt Solar Tile corresponds in width to seven roof tiles and can be installed in any quantity per row whilst adhering to string voltage requirements.

Each Volt Photovoltaic Solar Tile has one positive and one negative electrical lead for connection. These leads should be reversed in the cable containment tray on the rear of the Solar Tile at every second row of Solar Tiles.

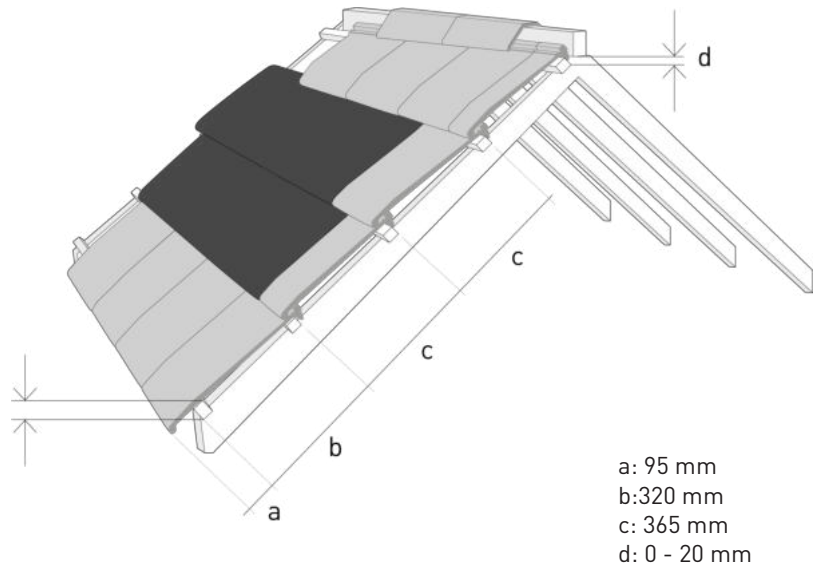
The Planum roof tile will be joined using the triangular method described as follows:

1. The wing or hangover tiles are placed first overlapping and fitting into each other. Placing the tiles starts on the right using half or full tiles and alternating them at the start of each new row.
2. The Volt Solar tiles will be placed in the same way.
3. Next the horizontal rows will be places from the wing to the ridge, alternating half tiles with full roof tiles at the end of each row.



Installation diagram:

1. Wing + right side finishing (Q88*K) + Planum roof tile + half roof tile (Q85*K).
2. Photovoltaic units + wiring.
3. Planum roof tile (TI) + half roof tile (Q85*K) + left side finishing (Q89*K) + ridge.



The first batten must be placed 30mm higher than the subsequent ones. This is to stop the first row from pitching down and will allow the ensemble to have a uniform gradient.

The Volt Photovoltaic Solar System must not be placed in the last rows. It is best to install it in the lower part of the roof to thus make the best use of airflow under the hangover.

The roof tiles must be connected following an 'S' pattern and the first and last roof tiles installed will be the ones connected to the inverter.

The first row of the roof should be Planum H-Selection Klinker then the solar units can be installed in the necessary number according to size of area projected. Once these have been installed, the rest of the surface will be completed with Planum (TI) in the traditional way ceramic roof tiles are laid.

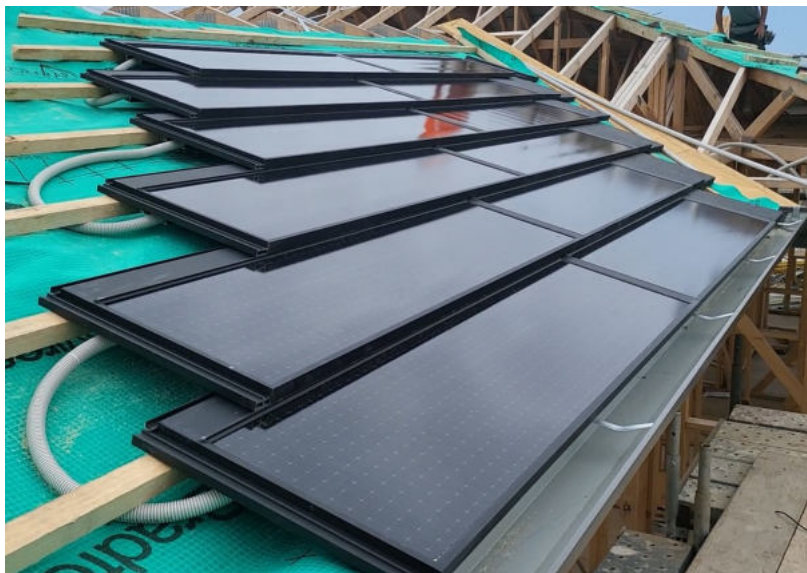
INSTALLATION OF MODULE WIRING

DC CABLE INSTALLATION

The solar tile has a cable tray at the rear of the solar module; this provides both a containment system and protection for the DC cables. The cables must be installed in this cable tray, once the solar tiles are laid with a 100mm gap between them the MC4 connectors are lugged together as shown below.



At the end of each row, a DC 'linking' cable is installed in a heavy-duty flexible conduit to the next row as shown in the below image.



- DC cables are stored in the cable trunking on the rear of the solar tile.
- MC4 connectors are plugged in as the solar tiles are laid and before being screwed in place.
- The positive plug connects to the negative plug of the adjacent tile in the same row.
- Complete DC connections and check that all connectors have made full contact.
- Complete the earthing connections and check for tightness and continuity.
- Check for continuous and increasing voltage at the end of each row.

EARTHING

Each solar tile is individually earthed with a manufacturer-supplied 4mm² earth cable that comes fixed to the rear of the module. Earth lugs are provided on each solar tile. The earth cable must remain continuous, and any joints need to be soldered.

To install the earthing system,

1. Run a continuous earth from the disconnection point (point of isolation) along the top of each row of solar tile on that roof plane ensuring the earth is continuous.
2. When placing the solar tile on the roof, loop the earth cable that is fixed to the solar tile under the batten so it is sitting above the solar tile.
3. Place the crimp over your continuous earth, there is no need to strip the earth cable as the crimp will pierce the insulation of the earth cable.
4. Close the crimp with the appropriate crimping tool ensuring that the connector engages the two connection lugs on the side of the earth crimp.
5. Check the lugs on the side of the factory fitted section of the earth crimp to ensure they have not become loose in transit or installation.
6. Perform a pull test on the join to check it is tight. Repeat this process at each solar tile.
7. Complete earth continuity testing of each solar tile to ensure they are adequately earth to the local legislative requirements.

PV ARRAY DC DISCONNECTION POINTS

The PV Array Disconnection Point location must be chosen to allow easy access to the MC4s for disconnection purposes.

To achieve this, we recommend installing the PV Array Disconnection Point under a roof tile immediately to the left of a Volt Solar Tile, allowing the easy removal of the roof tile above the Disconnection Point.

DO NOT INSTALL THE DISCONNECTION POINT UNDER A ROOF TILE THAT HAS A VOLT SOLAR TILE DIRECTLY ABOVE IT, AS THIS WILL MAKE REMOVAL OF THE ROOF TILE TO ACCESS THE DISCONNECTION POINT DIFFICULT.

Step 1: Install the supplied cable tray section on the end of the inbuilt cable tray at the appropriate location for the disconnection point.

Step 2: Drill two or four x 6mm holes through the tray as shown, depending on how many conduits are to be affixed to the tray.

Step 3: Run the Positive and Negative cables from the strings intended to be isolated to the installed cable tray section, taking care to mark the cables for future identification.

Step 4: Install DC cabling to the inverter in heavy-duty rated conduit protection and cable tie the conduit/s to the previously drilled holes in the cable tray. Label the cables with the required safety warning labels as shown.

Step 5: Terminate the cabling with compliant and compatible MC4 connectors. Install blank spare MC4 plugs into the array MC4s to make it safe. "Tag out" the MC4s as not to be connected.

Step 6: Install the “PV String Disconnection Point” location label to the roof tile directly above the Disconnection Point, using a suitable liquid adhesive, i.e. Sikaflex-221

Wiring: The DC isolator will be installed according to the design piecing provided for the project. The DC isolator/disconnector must always be installed to the left of the solar array and always in a position where the roof tile above the disconnection MC4s can be easily removed.



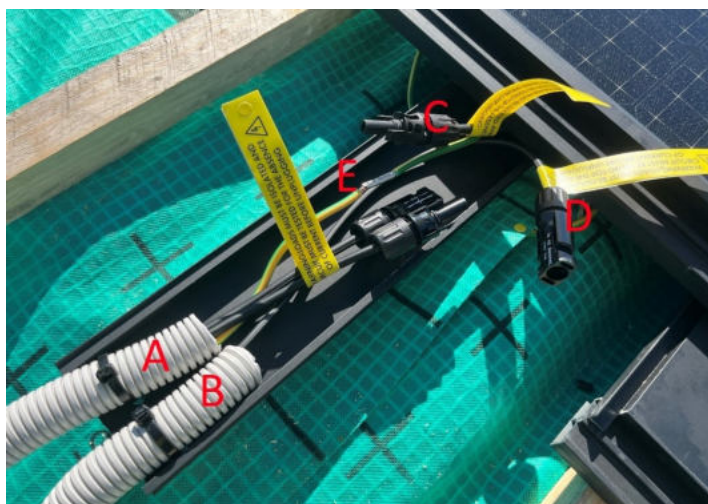
A - is the conduit bringing the DC cabling and earth from the inverter to the Disconnection Point at the array.

B - is the conduit bringing the negative DC cable from the other end of the array.

C - is the positive array cable MC4 from the junction box on the solar tile adjacent the Disconnection Point.

D - is the negative array cable MC4.

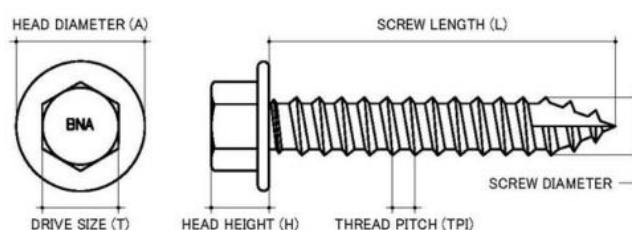
E - is the crimped lug joining the earth originating at the switchboard to the array earthing cable attached to the modules.



FIXING THE SOLAR TILES TO THE BATTENS

Each Volt Solar Tile is secured with two 2.5 mm hexagonal head countersunk as per the specifications below.

Size/Diameter	14g/6.3mm
Material	The screws must be Stainless Steel
Thread type	Coarse
Drive size/type	5/16" hex socket
Screw length	15-20mm
Driver tool	Impact
Max torque	TBC



Screws are to be fixed in at least two of the holes provided on the mounting frame of the solar tile, as per the image below. The fixings should be within 250mm of the edge of the solar tile.

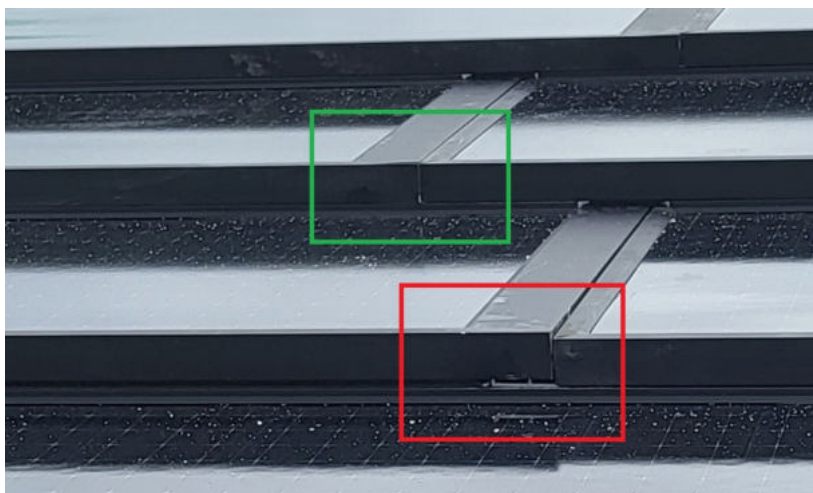


The fixings should be screwed through the V channel located on the batten lug as shown below, this will stop the screw from moving then tapping through the aluminium batten lug.



INTERLOCKING

You must always ensure that the solar tile interlock has correctly engaged, the image below shows a solar tile in which the upper solar tile has not correctly engaged in red and the correct engagement of interlock in green. This can cause roof leaks and is a non-compliant installation.





WARRANTY

La Escandella Volt Photovoltaic Solar System has a fifteen-year warranty and back to back warranties from the individual manufacturers as long as the product warranty register is requested. If the client does not register the warranty, La Escandella guarantees its product for five years.

Regarding the photovoltaic units, La Escandella guarantees the Volt Photovoltaic Solar System (I) from the sales date along with a copy of the invoice certified by the company (DATE OF SALE) to the first client to install (for their own use) the UNITS (CLIENT) or (ii) for 12 months after the sending of the UNITS from the manufacturer, whichever takes place first (DATE THE WARRANTY STARTS).

1. LIMITED PRODUCT WARRANTY

Ten/twelve-year repair, replacement or refund.

The Company guarantees that the Volt Photovoltaic Solar System including its connectors and DC wires assembled at the factory are free of material and manufacturing defects, according to the mechanical and electrical specifications set out in the product data sheet, under normal use and adequate installation according to the Suntech installation guide, conditions of use and service.

If the Volt Photovoltaic Solar System does not comply with this warranty during a period of 120 months for construction of integrated photovoltaic tiles and, 144 months for the solar panels, from the start of the warranty date, the company will, at your choice, repair or substitute the product or reimburse the price of the product at the time of the resolution of the warranty with similar units. Submission of a claim for repair or substitution or reimbursement will be the only submission allowed within the Limited Product

Warranty and will not be extended further than the time period established in this document.

This Limited Product Warranty does not guarantee a specific power output, which will be covered exclusively in clause 2, from here on "Limited Maximum Power Warranty".

The client is also entitled to indemnisation in the event of any other reasonable loss or damage. If the fault does not imply a serious one, the client has the right

to have the problem corrected within a reasonable period of time.

In the event of serious breach of service, the client will have the right to:

- cancel the services hired from the company, or
- a reimbursement for the piece not used, or a reduced value compensation.

The client also has the right to choose either a refund or substitution for faulty goods. If a malfunction of the goods or services does not constitute a serious fault, the client has the right to have the fault corrected within a reasonable period of time.

If this should not occur, the client has the right to obtain a reimbursement for the faulty goods and to cancel the contract for the services hired and obtain reimbursement for any part not used.

The client also has the right to indemnisation for any other reasonably foreseeable loss or damage resulting from any fault in goods or services.

2. MAXIMUM CONSUMPTION WARRANTY- LIMITED RECOURSE

The Company guarantees that the for a period of 25 years the unit will maintain a level of performance as follows:

- Regarding the photovoltaic tiles in the building the unit's real output will not be inferior to 95% in the first five years, 90% in the following five years and 80% after 25 years.
- The unit's real output will not be inferior to 97% of the power output on the label during the first year. Thereafter a 0.7% maximum decline per year levelling at 80.2% after 25 years from the date of the start of the warranty.

3. EXCLUSIONS AND LIMITATIONS

Within the legal boundaries:

(1) In any case, all claims must be received within the warranty period for the warranty to be viable.

(2) The Limited Product Warranty and the Limited Maximum Power Warranty will not be applicable to any unit which has been subjected to: incorrect

use, abuse, negligence or accident; alterations, incorrect installation or application; failure to follow the company's installation manual or maintenance instructions; repair or modifications by a non-authorized technician; overvoltage, lightning, flood, fire, accidental breakage, inadequate connections which result in dangerous inverted current or other external factors beyond the company's control.

(3) Neither the Limited Product Warranty and the Limited Maximum Power Warranty cover any cost of installation, removal or re-installing of the units (subject to the last sentence in Clause 5) or customs fees or any other cost stemming from return of the units.

(4) Warranty claims will not be accepted if the type or unit series number have been altered, erased or are unreadable.

(5) Limited Product Warranty and the Limited Maximum Power Warranty are not applicable to units marked "A-1 Grade" or which are deficient. There is a specific warranty under Limited Warranty for Photovoltaic Units Graded A-1.

4. WARRANTY LIMITATION SCOPE

This Limited Warranty for Photovoltaic Units, according to that which is set out in the present document, are substituted and exclude all other warranties, expressed or implied, including commerciality and fit for a purpose, use or application along with all the other obligations or responsibilities on the Company's behalf, unless the other obligations or responsibilities are expressly agreed on in writing, signed and approved by the company.

The company will not be responsible for damages to persons or property or any other loss or damages resulting from anything relative to the units, any defect of use or of installation relative to the units. Under no circumstance will the company be held responsible for incidental, consequential or special damages, irrespective of losses.

Wear, loss of benefits, loss of production or loss of income are specifically excluded and without limitation. The added responsibility of the company, in the event of damages, will not exceed the value of

the invoice paid by the consumer for the unit.

For the statement, this limited warranty will not affect any additional right within jurisdiction pertaining to the sales of consumer goods. Some States do not allow the exclusion or limitation of incidental or consequential damages, for which reason said limitations or exclusions within this limited warranty may not be applicable to you.

5. OBTAINING PERFORMANCE WARRANTIES/ CLAIMS PROCEDURE

If the client wishes to present a claim in view of that set out in the Limited Warranty for Photovoltaic Units, the client will immediately notify the company by letter, fax or e-mail, providing name and address of the client, the claim including the type and model of the unit in question, the amount affected, the corresponding serial numbers and the date of acquisition of the unit(s). The notification will include a copy of the invoice with the company stamp or the builders' invoice as proof.

The client will present the claim, in view of that set out in this limited warranty, immediately after discovering breach of warranty and within the warranty validity period.

Units cannot be returned without the company's written authorization.

As allowed by legislation and subject to the last sentence of this clause, The Company, at its sole discretion, will reimburse the client (based on the buying price and taking into account any devaluation) for the faulty unit(s) or will repair or replace the faulty unit(s).

Relative to the Limited Product Warranty, as with the Limited Maximum Power Warranty, the company will reimburse the client for a reasonable amount, normal maritime goods transport expenses and documentation, both for the authorized return of faulty units as for the replacement of repaired or substituted units, only if this cost is authorized by the company.

6. POSSIBLE SEPARATION

If one part, provision or clause within this Limited Warranty for Photovoltaic Units or its application

to any person or circumstance is considered invalidated, void or unenforceable, said premise will not have the same effect on all other parts, provisions, clauses or applications of this Limited Warranty for Photovoltaic Units and, to that effect, the remaining parts, provisions, clauses

or applications within the Limited Warranty for Photovoltaic Units will be separable.

7. MISCELLANEOUS

The repair, substitution or supply of additional photovoltaic units will by no means constitute a renewal of the warranty conditions nor will the original terms of this Limited Warranty for Photovoltaic Units be expanded.

The substituted units will become property of the Society to be disposed of accordingly. La Escandella has the right to deliver a different type of unit (different in size, colour, shape and/ or power) in the event the company has ceased to produce the model(s) being substituted at the time of the claim.

8. WARRANTY TRANSFER

This Limited Warranty for Photovoltaic Units is transferrable when the product remains in its original installation location.

9. FORCE MAJEURE

The company will not be liable before the consumer nor any third party for any breach or delay in compliance of the conditions of sales, including this Limited Warranty for Photovoltaic Units due to force majeure including but not limited to, protests, strikes, war or conflict, fire, floods, or any other cause or similar circumstance beyond the company's control.

In the event of any of the abovementioned, the Society's obligation to the Limited Warranty will be suspended without being held liable for whatever time the aforementioned conditions persist.

10. FAULTY LOTS

In the event of faulty photovoltaic unit lots, La Escandella will keep all the details of the installation projects and notify the owners of the project(s) via e-mail, telephone or post with the details provided at the time of the installation. The notification will include details on how to remedy the faults.

11. VALIDITY OF AID

This Limited Warranty for PV Units is valid for all the photovoltaic units installed by La Escandella or other authorized companies.

All claims made regarding this warranty must be submitted in writing via post or e-mail to the following addresses:

Crta Novelda 2.5km
Agost 03698 (Alicante) España escandella@laescandella.com

To make a claim valid, the claimant must notify La Escandella of the problems with the product, allow the company reasonable access to the property to inspect or test any tile and evaluate the nature of the problem.

MAINTENANCE

Complete maintenance to inspect how the product is working, its safety system and to clean the photovoltaic units must be carried out annually.

It is not recommendable for the owner of the system to clean the units with detergents or other chemical products.

If the units are soiled, it is best to clean them with water, especially around the chimney.

The La Escandella solar energy photovoltaic system for roofs requires very little maintenance.

Those pieces which require maintenance are listed as follows:

WIRING

- Visual check of the conduits.
- Ensuring all the wiring is mechanically protected, when needed.
- Small repair when a wire comes loose or is incorrectly connected.
- LV, CC and CA wiring are easily identifiable

ISOLATION

- The isolator tension and the current classifications comply with the system design.
- The casings are IP standards, adequate for installation.
- The casings are correctly installed and sealed.
- Lockable isolating device.
- Labelling of the proper isolator.
- Proper installation of DC and AC segmentation.
- Proper installation and operation of string fuses.

PANELS

- Visual inspection of all panels for damage or corrosion.
- Visual inspection of the junction boxes, leads and sockets where the inverter is accessible.
- The shutdown procedure must be fixed to the inverter.
- Proper functioning.
- Checking fault history codes (if available with inverter).

OPERATION

- Efficiency of the registry system since the last servicing.
- Taking note of daily efficiency averages (depending on the inverter)
- Checking the efficiency differences between matrixes.
- Ensuring tension, voltage and current are within the system design parameters.



La Escandella
ROOFING THE WORLD

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