

La Escandella

ROOFING THE WORLD

Installation Manual Planum Photovoltaic Solar System





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Cutting Edge **Innovation**



Perfectly Integrated Planum 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.



1. Planum H-Selection klinker roof tile (TI)

Higher resistance
The clay composition together with the perfect pressing allows flexion higher than the required while only weighing 3.5 kg.

High definition on each piece
The gypsum moulds provides a perfect finish, obtaining a smoother texture, no contact points nor creases.

Lower absorption (<5%)
High quality clay together with high firing temperature mean higher resistance to ice and mildew.

Double interlocking
The double interlocking -horizontal and vertical- allows the roof to be more watertight, ensuring its impermeability even at low pitch.

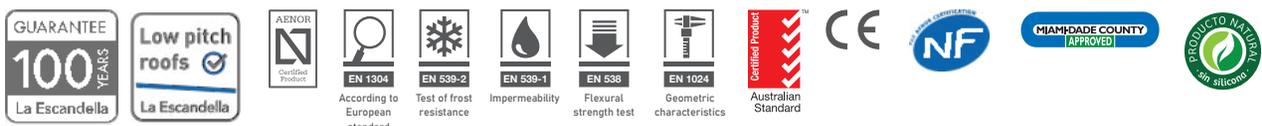
Excellent finish
H-Cassette manufacturing provides a perfect finish to each product.

Cost reduction
Its large format (11 units/m²) and strapping every 5 units, as well as its packaging on pallets of 240 and 320 units, reduce installation costs.

Characteristics

Dimensions*	L 441 mm; W 278 mm, H 32 mm / L 17.36", W 10.94", H 1.26"
Pieces per m ² /sq.	11 / 101
Weight per piece	3,5 kg / 7.71 lbs
Longitudinal fit**	370 mm (+6; -44 mm) / 14.57" (+0.24"; -1.73")
Transversal fit**	237 mm / 9.33"
Units per pallet	240 / 320
Weight per pallet	840 kg (1851.88 lbs) / 1.120 kg (2469.18 lbs)
Placement	Broken bond

*The tile dimensions indicated in this chart allow a tolerance of approximately ±2%.
**Theoretic value: this should be re-calculated on site with the tiles that are to be used.





2. Planum Photovoltaic Solar System



10 Mono-Crystalline Cells
47W Energy generated
17% Maximum efficiency
0~+3% Output range

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

Tempered glass: Anti-reflective coating and high conductivity crystal increase power output and the mechanical resistance of the tile.

EVA and TPT: High quality EVA and TPT materials protect the tile from breakage and water leaks, 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).

2.1 Technical Features

Dimensions	823 x 340 x 61 mm
Pieces/m ²	3,2
Equivalancy of Planum	3,5
Planum photovoltaic solar tile weight	11,2 kg
N° of monocrystalline cells	10 (2 x 5)
Cell size	156 x 156 mm
Placement	Broken bond

2.2 Packaging Features

Number of tiles per box	22
Number of boxes per container 20' / 40' / 40HC	24 / 48 / 60
Size of box	1450 x 900 x 560 mm
Weight of box	290 kg

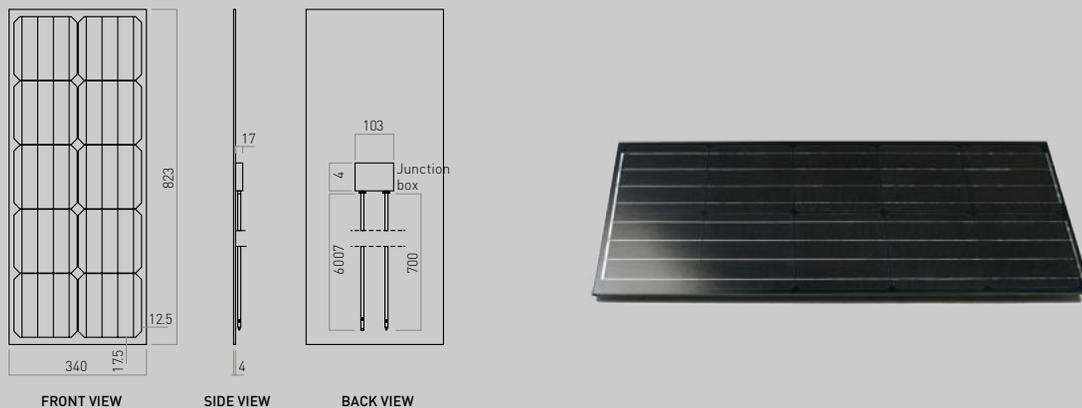
2.3 Heat Transfer Coefficient

Power Tolerance	0~+3%
Temperature Coefficient of Pmax	(-0,4 ± 0,05) % / °C
Temperature Coefficient of Voc	(-0,34 ± 0,02) % / °C
CTemperature Coefficient of Isc	(0,05 ± 0,01) % / °C
NOTC (°C)	(47 ± 2) °C

2.4 Manufacturing Materials

Front Glass	3,2 mm, Low Iron, tempered Glass
Junction Box	IP 67 Rated (Black)
Output Cables	TUV 1 X 4 mm ² , lenght: 600 / 700mm
Connector	Hengda PV-ST01 - MC4
Encapsulation Material	EVA (0,45 ± 0,03 mm thickness)
Back Foil	Black TPT (0,32 ± 0,03 mm thickness)
Fixing Adhesive	Silicone Sealant (Black)

2.5 Diagram of Photovoltaic Unit (without frame)



2.6 Operating Conditions

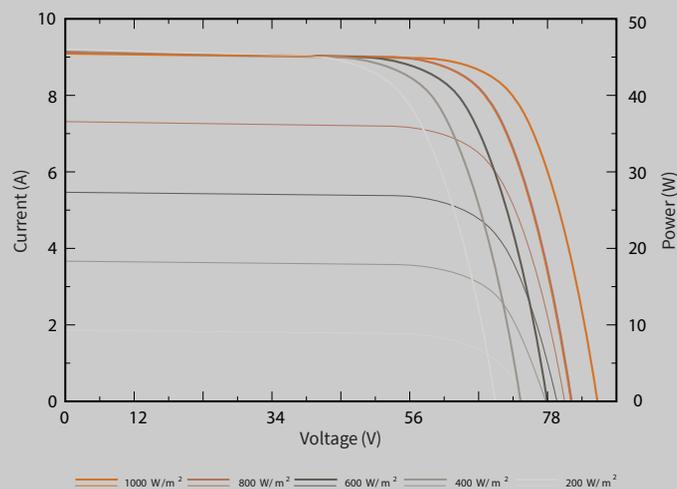
TMax. system voltage	1000 DVC (IEC)
Max. system fuse rating (A)	10
Operating temperature (°C)	-40 ~ 85

2.7 Electrical Parameters in Standard Testing Conditions (STC)

Module Type	BREC47S-Rab
Rated Maximum Power	47 P _{max} /W
Maximum Power Voltage	5,18 V _{mp} /V
Open-circuit Voltage	6,67 V _{oc} /V
Maximum Power Current	9,19 I _{mp} /A
Short-circuit Current	9,68 I _{sc} /A
Module Efficiency	17%

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

2.8 Tension Curve



2.9 Certification



3. 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 a BMC 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.

3.1 Liability Exemption

Installation, handling and use of the Planum 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 Planum 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 Planum Photovoltaic Solar System installation manual must be read together.

4. 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 Planum Photovoltaic Solar System can only be installed by electricians accredited by the Ministry of Industry.

Potentially deadly AC voltage may result when the photovoltaic units are exposed to a light source: Avoid contact with electrically charged parts and ensure live circuits are isolated before making or cutting off any connection.

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 the unit may result in electrical shock. Do not use a unit in which the glass is broken or with a damaged backing.

Do not dismantle or remove any parts from the units.

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.

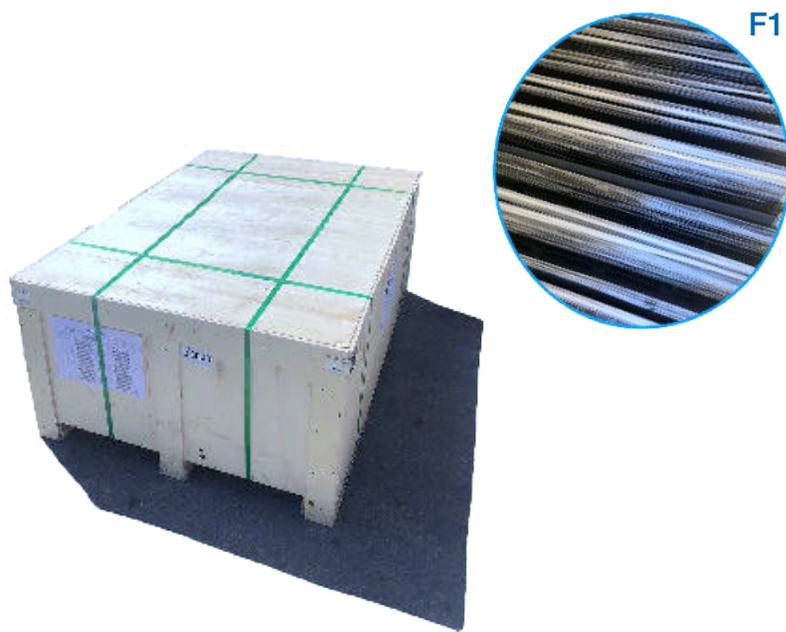
Procedure for disconnection. Remember that the photovoltaic units will generate a potentially deadly AC current if they are exposed to any source of light. Extreme caution must be taken when working with photovoltaic units. The matrix isolator will not disconnect the units, it will only isolate the wiring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

5. Packaging

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



F1: View of the interior of a box. Planum Solar Tiles are packaged individually with a cardboard sheet between each tile.

- Packaging must be stored under special conditions. It must never be exposed to weather or allowed to be exposed to moisture.
- Planum Photovoltaic Tiles should not be piled up.
- Once on the building site, Planum 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.

6. Design and 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 20°**
- b) Maximum roof gradient angle requirements.**
- c) Lath requirements, especially the spacing in the support framework.**
- d) Installation requirements for horizontal and vertical laths.**

6.1 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.

6.2 Orientation and Gradient

The Planum Photovoltaic Solar Systems for La Escandella are designed for a gradient angle of 22° 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.

6.3 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).

6.4 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 Planum Photovoltaic Solar Systems must not be altered or augmented in any way without written consent from La Escandella.

6.5 AC Wiring

The AC 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 tiles. The AC 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.

6.6 AC Wiring – Installation Method

The Planum Photovoltaic Solar System wiring is contained within the wiring trays found on the back of the Planum solar tile. The wiring that comes out from the power coupling box is protected by a highly resistant conduit. According to the following method, the connection between a Planum tile in a link of solar tiles is done through an MC4 T&Y 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 AC 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).

6.7 DC Links, Electrical Design and Installation

The AC 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.

7. 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 Planum 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.

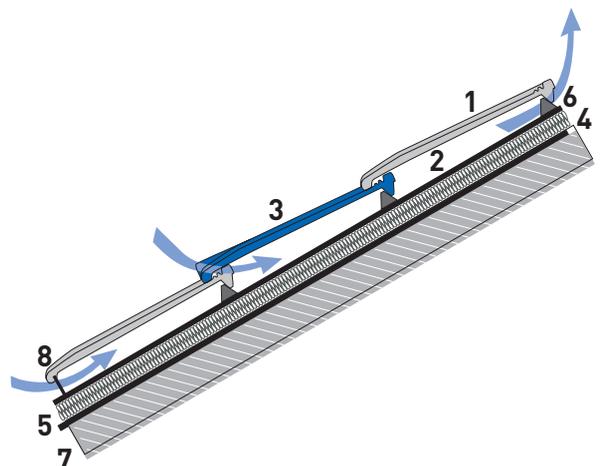
Panel requirements are:

- 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 Planum Photovoltaic Solar Tile Installation

		Product	Unit	+ info
Wooden battens or Metal battens	Screws	CAM77	4 units	
	Wooden battens	CAM048	2 units	5 X 5 cm
	Screws	CAM77	2 units	
	Metal battens	CAM043	2 units	5 x 5 cm
Planum Solar Tile		CAM099	1 unit	
	N° W/unit		47 W	
	N° tiles/m ²		3 units	Equal to 11 (TI)
	N° W/m ²		141 W	
Impermeabilización				
	Rafter	CAM55	1 unit	Available 135 and 150 gr/m ²
	Insulation	CAI55	1 unit	Available from 30 to 80 mm
	Waterproof underlayment material	CAM52	1 unit	Available 115 - 180 gr/m ²

7.1 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 (CAI555) 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 5cm is required. For vertical laths, 3.5cm is the requirement in compliance with the technical roofing code.

How the battens are secured will depend on the material they are made of. Each Planum Solar Tile is secured with two 5cm countersunk screws (CAM77) placed through the hole marked at the top of each unit. These screws must be rust proof and they must be sealed to prevent water getting in.

Check La Escandella installation manual for more information.



7.2 Mounting the Roof

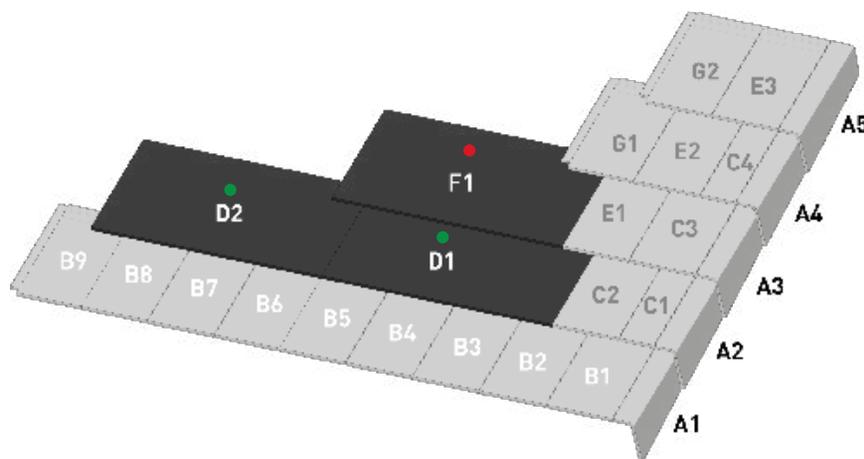
The Planum Photovoltaic Solar System is to be installed according to the standard technical installation manual for Planum H-Selection roof tile. The Planum Solar Tile corresponds in width to three and a half roof tiles and must be installed in multiples of two.

Multiples of two are recommended so that the connections between rows be direct and to avoid the use of extensions or extra wiring and thus affect the connection between roof tiles.

Each Planum Photovoltaic Solar Tile has a green or red sticker depending on the connection. Tiles with the green stickers are positive on the right and negative on the left. It is the opposite for tiles with a red sticker; positive on the left and negative on the right. So, previous to separation, the colour to start out with will be pointed out, as shown in the diagram.

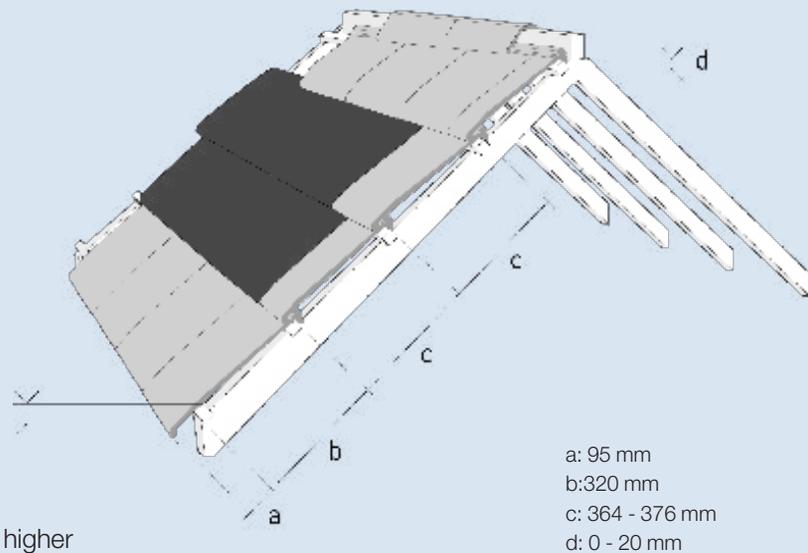
The Planum roof tile will be joined using the triangular method described as follows:

- 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 Planum Solar tiles will be placed in the same way. Keep in mind that roof tiles with green stickers go in the first row, tiles with red stickers in the second and so on. (This might be done reversely, depending on the project).
- 3) Next the horizontal rows will be placed from the wing to the ridge, alternating half tiles with full roof tiles at the end of each row.



Esquema de montaje:

- 1) Wing + right side finishing (Q88*K) + Planum roof tile + half roof tile (Q85*K).
- 2) Photovoltaic units + wiring.
- 3) Planum roof tile (Tl) + 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 Planum Photovoltaic Solar System must not be placed neither in the first nor 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.

Wiring: The AC isolator will be installed according to the design piecing provided for the project. The AC isolator must always be installed at the end of the last row of roof tiles.



7.3 AC Wiring

The AC wires go into the conduit at the top of the solar tile. The longer negative connector goes through the conduit and plugs into the following connector. The positive plug connects to the negative one from the previously laid tile and so on.

Once the AC connections have been completed, you must check that all the plugs are correctly connected.



The AC wire must remain in the wire containment box of the first and last solar unit of each row. The lead connector and the same made in situ, are fitted in flexible and solid HD conduits between the isolator and the first and last modules to complete the circuit.

The isolator must be installed next to the first photovoltaic unit of each line on the lowest row. Wiring is done row by row from the bottom to the top of the roof.



8. Warranty

La Escandella Planum Photovoltaic Sola System has a ten-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 Planum 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 Planum Photovoltaic Solar System including its connectors and AC 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 Planum 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 indenisation 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 indenisation 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.

9. 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 range or diode blocking 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

www.laescandella.com

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