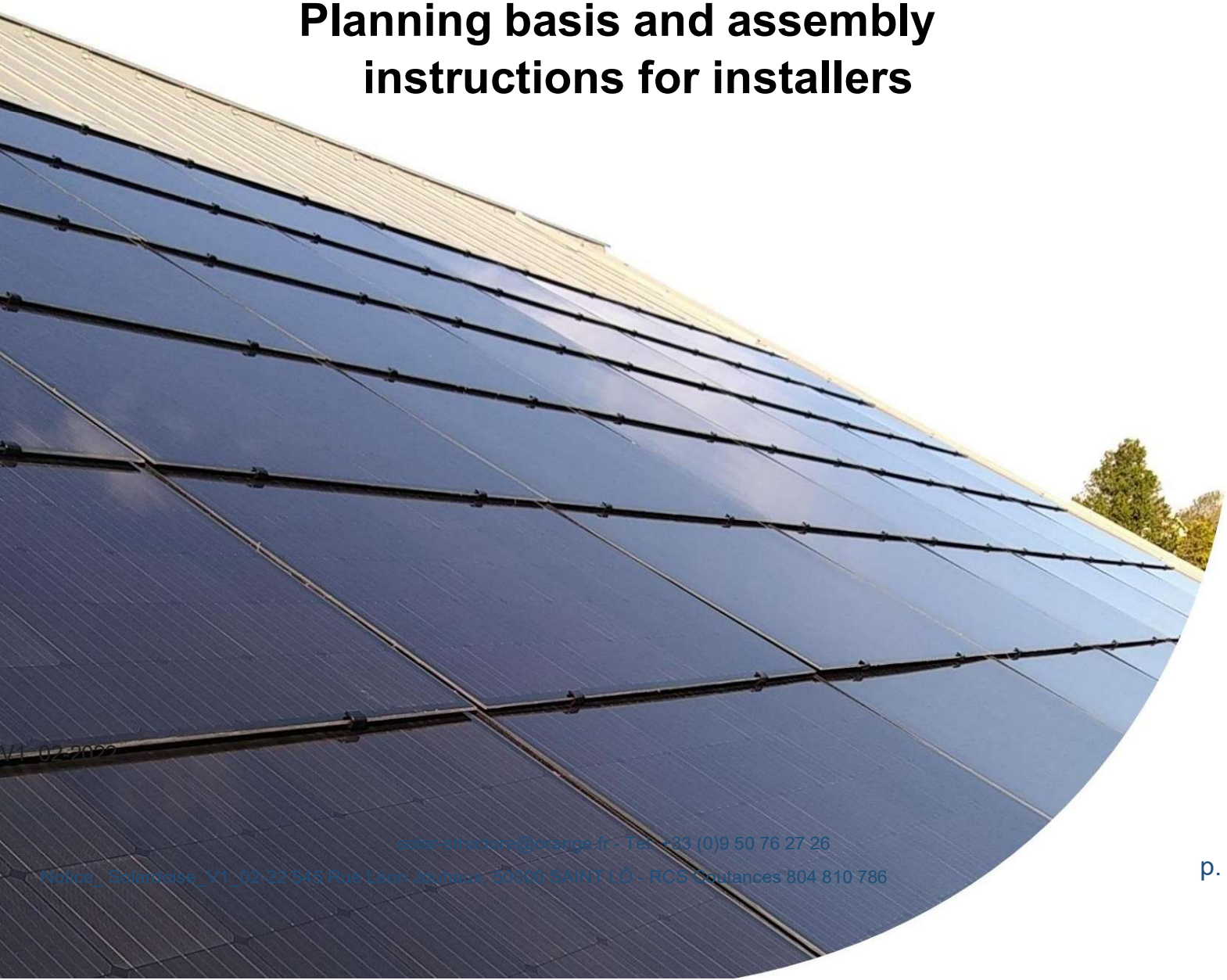
SOLARDOISE

Solar roof system

Planning basis and assembly instructions for installers



solar-structure@orange.fr - Tel: +33 (0)9 50 76 27 26 545 Rue
Léon Jouhaux, 50000 SAINT LÔ - RCS Coutances 804 810 786

1 Introduction

1.1 Preface

Please read this planning, assembly and installation instructions carefully before starting work. Failure to follow this notice may result in personal injury and property damage.

Please store this notice safely

1.2 Representation of safety instructions 1.2.1 Signaling word

In this manual, all warnings are preceded by a signal word indicating the degree of danger:

HAZARD

Imminent danger threatening people Risks incurred: death or very serious injuries

Signal color is red

ADVERTISEMENT WARNING

Potentially dangerous situation

Risks incurred: death or very serious injuries

The signal color is orange.

ATTENTION ATTENTION

Potentially dangerous situation

Risks incurred: minor injuries, material damage

The signal color is yellow.

ATTENTION ATTENTION

Situation causing immediate damage

Risks incurred: damage to equipment and its environment

The signal color is yellow.

INDICATION

Situation that could cause damage

Risks incurred: damage to equipment and its environment

The signal color is blue.

1.2.2 Warning example

Type and origin of the danger
Risks incurred
Steps to take to avoid danger

1.2.3 Safety symbols used

This manual contains the following safety symbols:

Warning symbol

General danger

Dangerous electrical voltage

Bond symbol

Important information

Follow the manual

Indication symbol

Useful tips and information.

General exclusion of liability

No liability for any damages relating to improper installation will be assumed.

Required Components

In addition to the equipment matched to the system delivered by SOLAR STRUCTURE, certain components must be supplied by the client. You will find an overview of these components on page 49.

Module formats

The indications in these assembly instructions relate to standard format Solardoise elements.

1.3 General description of the system

The field of application of the Solardoise solar roof system is the integration of frameless solar panels into roofs. Photovoltaic elements replace the outer layer of a traditional roof (slates for example). They can replace the entire roof or just certain parts, the possibilities of use being practically without restrictions.

The photovoltaic elements are installed vertically, with an overlap of 150 mm. In the horizontal direction, waterproofing is carried out by glass fiber reinforced polymer gutters.

These gutters are placed under the PV elements. They are equipped with rubber supports on which the PV elements rest.

The PV elements are held by 2 plastic-coated stainless steel hooks.

1.4 Safety instructions

These installation instructions are only intended for craft companies with some experience in the field of photovoltaic installations.

In France, the requirements of the competent professional associations (Photovoltaic Generators Connected to the Grid; Technical Specifications Relating to the Protection of People and Property) must be respected.

INDICATION

Solar Structure excludes all liability for damage resulting faulty planning and installation, for example due to a lack of qualified personnel.

1.4.1 Instructions

⚠ DANGER

The solar panels are under electrical voltage to the light.

Danger to life from electrocution and electric arcs.

Danger of fire and injury.

• Solar panels can only be protected at the DC switch: in the event of a breakdown (short circuit, earth fault), the installation continues to operate on the DC side.

• Arcing may occur when contacts are broken under load.

• Do not insert any part (carrying current) into the connectors or taken from solar panels.

• Do not mount solar panels or lines with connectors damp.
Tools must be dry and working conditions protected from humidity.

• Carry out all work on the lines with the greatest attention.

• Improper installation may result in fire.

• Keep children away from solar panels, inverters and other components of the installation carrying the current.

1.4.2 Solar panels

modules are designed in accordance with the international standard IEC 61215-1:2021, IEC 61215-1-1:2021, IEC 61 215-2:2021, IEC 61730-1& IEC 61730-2:2023The PV modules have been qualified for protection class Ⅱ.

INDICATION

Handling solar panels.

Reduced production due to damaged solar panels. • Do not use damaged solar panels. • Do not disassemble the solar panels. • Do not subject the solar panels to any sunlight

artificially concentrated.

• Do not treat solar panels with paint or adhesives or handle them with sharp objects.

• Do not clean the solar panels with harsh cleaning products. solvent based.

1.4.3 Other suppliers

INDICATION	
Faulty installation, commissioning or maintenance. The manufacturer's safety instructions as well as those of the manufacturer of the inverters and other system components must be observed. Observe the assembly instructions.	

1.4.4 Handling

INDICATION	
Notes on interim storage, unpacking and transportation of solar panels **Always handle solar panels with the greatest care.** • Always handle/load pallets from the rear side of the backsplash. • Always transport solar panels in the packaging provided for this purpose. effect. • Always carry solar panels with two hands. • Wear safety gloves. • Do not use the junction box or connecting cable as handle. • Avoid any bending of the solar panels. • Do not place a load on the solar panels, do not walk on them or make them fall. • Do not handle the solar panels with sharp objects, for example when unpacking. • Always keep electrical contacts clean and dry. • Only consider intermediate storage in dry rooms. • Do not place the solar panels on a hard base such as glass, stone, concrete or metal for example.	

INDICATION
Gutters must be protected from mechanical damage. It is also necessary to ensure low bending when handling long profiles (risk of breakage and injury).

1.4.5 Buildings and regulations

INDICATION

Before assembling the installation, check the structural stability of the building and the substructure which will serve as the basis for the installation.

INDICATION

Connection plates must be earthed in accordance with local regulations.

Attach an earthing cable (Cu, 16 mm2 minimum, UV resistant) to a suitable location on the connection plates and to the equipotential bonding rail of the building, so that it conducts electricity durable, using a screw connection. All sheet metal parts must be connected together in such a way that

conduct current.

INDICATION

Please note the serial numbers of the solar panels in case of questions.

1.5 Requirements

Be sure to observe the applicable standards, local construction and accident prevention regulations before and during installation of the system.

INDICATION

The list of standards and requirements mentioned represents only a selection and is not exhaustive. (December 2010 version)

The connection to the mains of the PV installation must only be carried out by an approved electrician.

1.5.1 Requirements for France

The installation of equipment will be subject to compliance with photovoltaic industry standards and standards relating to low-voltage electrical installations,
notably :

- NF C 15-100 (October 2010): low voltage electrical installations: Rules,
- NF EN 61724 (December 1999): descriptive parameters of a photovoltaic system,
- UTE C 57-310 (October 1988): direct transformation of solar energy into electrical energy,
- UTE C 18 510 (November 1988, updated 2004): collection of instructions general electrical safety,
- C 18 530 (May 1990): electrical safety prescription booklet intended for authorized personnel,
- NF EN 61727 (September 1996): Photovoltaic (PV) systems - Characteristics of the network connection interface,
- IEC 61723: safety guide for grid-connected PV systems mounted on buildings,
- CEI 60364-7-712: Electrical installations in buildings - Part
- 7-712 Rules for Special Facilities and Locations - Solar Photovoltaic (PV) Power Supplies (May 2002)
- NF EN 61173 (February 1995): Protection against overvoltages of photovoltaic (PV) energy production systems - Guide,
- NF EN 62305-1 of June 2006; NF EN 62305-2 of Nov 2006: Protection against lightning - Installation of lightning rods: Rules,
- NF C 17-102 (July 1995): Protection against lightning - Protection of structures and open areas against lightning by lightning rod with voltage initiation device: Rules,
- NF EN 61643-11 (2002) Low-voltage surge protectors connected to systems low voltage distribution - Requirements and tests
- DIN VDE 0126 (April 1999) Specifications for inverter operation (islanding, voltage and frequency window, direct current injection) - Inverter cutoff conditions
- NF EN 61000-3-2 (Corrected version) August 2006: Electromagnetic compatibility (EMC) - Part 3-2: limits ¬Limits for harmonic current emissions (current drawn by devices less than or equal to 16 A per phase) .

The following regulatory texts and guides must also be respected:

- Decree No. 88-1056 of November 14, 1988 and its orders for the protection of workers who use electrical currents,
- Decree No. 92-587 of June 26, 1997 relating to the electromagnetic compatibility of electrical and electronic devices,
- Circular DRT 89-2, February 6, 189, Application of decree 88-1056,
- Snow and Wind rules,
- Fire safety regulations in establishments receiving the public and/or workers,
- The UTE Guide C 15-400 (2005): Connection of electrical energy generators in installations supplied by a public distribution network,
- The UTEC User Guide 15-443 (2004): Choice and implementation of low voltage surge protectors
- The EDF/ARD Guide (2003): Access to the low-voltage network for photovoltaic installations - Technical and contractual conditions of connection,
- The ADEME Guide (2004): Photovoltaic systems connected to the network - Guide to drafting technical consultation specifications for the project owner. The ADEME Guide (2001): Protection against the effects of lightning in installations using renewable energies.
- The UTE C 15-712 Guide (July 2010 Version): Installation of generators solar photovoltaics,
- CSTB Atec: in progress

1.6 Installation conditions

The Solardoise solar roof system is sized in accordance with current local regulations. It is designed for regions and exposures where loads lower than approved static loads are expected. Maximum static test load of the front side is 5400pa (design 3600Pa, safety factor 1.5) and back side is 2400pa(design 1600Pa,safety factor 1.5)

1.Modules should be installed in locations where the altitude is less than 2000m.
2.We recommend the modules to be installed in an environment temperature from -40 ℃ to 40 ℃.
The anticipated 98th percentile module operating temperature is less than 70 °C;
3.The installation position of modules should be consistent with the requirements of various kinds of electrical and fire codes. Fire rating of this module is class A (UL790). When modules are installed on the roof, the roof needs to be fire-resistant, therefore, the design of the housing structure, the selection of raw materials for the roof as well as the local relevant laws and regulations need to be taken into consideration.

The Solardoise solar roof system fulfills the weather protection functions of a conventional roof covering in case of sloping roofs when the following conditions are met:

- Roof slope from 15° to 55°.
- A waterproof undercover is required. For slopes less than 20°, a seamless waterproof undercover is required.
- The roof must correspond to current technology as well as the standards and regulations in force, for example be made of robust slats

made of well-dried wood (humidity < 15%). The strength must only be reduced by holes from knots and other defects by a maximum of 20% and only once per running meter.

- The execution of the construction must be carried out by a professional company and all the points of this manual must be respected (execution of the construction in accordance with the regulations).
- Solardoise solar panels are only intended for use in temperate climatic zones (e.g. central Europe).

The following points should be observed when installing solar panels:

- Sufficient rear ventilation of the solar panels to avoid loss of performance due to heat accumulation. This can be achieved by applying appropriate ventilation to the drip edge and ridge in combination with sufficient counterlattice height.
- Do not install solar panels near easily flammable gases and vapors (gas tanks, gasoline pumps, painting installations).
- Do not install solar panels near open flames or flammable materials.
- Do not expose solar panels to concentrated light.
- Do not mount solar panels as canopies or building elements. facade.
- The roof surface must not be shaded by trees, buildings placed in front or objects mounted on the roof itself as this may result in losses in efficiency and reduce the lifespan of the components used.

INDICATION

The roof must meet current standards and regulations. The roof slats, beams and under-roof must be in perfect condition.

INDICATION

If it must be possible to walk on the roof for service purposes (page 51 access instruction), a break-resistant awning must be available for people.

INDICATION

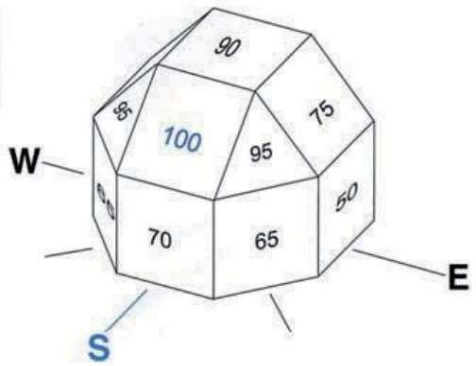
In the event of precipitation between the installation of the roof slats and the assembly of the Solardoise installation, the lath will need to be covered to prevent it from absorbing moisture. Otherwise there is a risk of shrinkage due to drying and the hooks would no longer be firmly attached to the slat.

1.7 Installation recommendations

Pan and tilt

The orientation of the solar panels is directed towards the South optimally in Central Europe and has an inclination of 30° approximately

In Northern Europe, the angle of inclination is more acute, in Southern Europe more obtuse. The energy efficiency of the installation is reduced if there is a deviation from the optimal orientation and inclination. The following chart can be used to provide an indicative value.



Absence of shading

Fig. 1 Approximate energy yield in percentage based on roof orientation

A module is said to be shade-free when it does not receive shade over its entire surface throughout the year and solar radiation is not obstructed. Even small partial shade such as chimneys, antennas, trees (consider their growth) and street lamps cause a loss of yield.
For this reason, solar panels should be installed where influences due to shading are lowest during the day or even completely excluded.
If necessary, a shading analysis will need to be carried out using a simulation program or a sun position analyzer.

Dirtying

Temporary shading due to clogging (dust, bird droppings, leaves) can cause a loss of yield. Advice on eliminating this type of fouling will be given (page 48).

Rear ventilation

The performance of solar panels decreases as the temperature rises. This is why it is important to ensure sufficient rear ventilation.

2 System specifications

2.1 System components

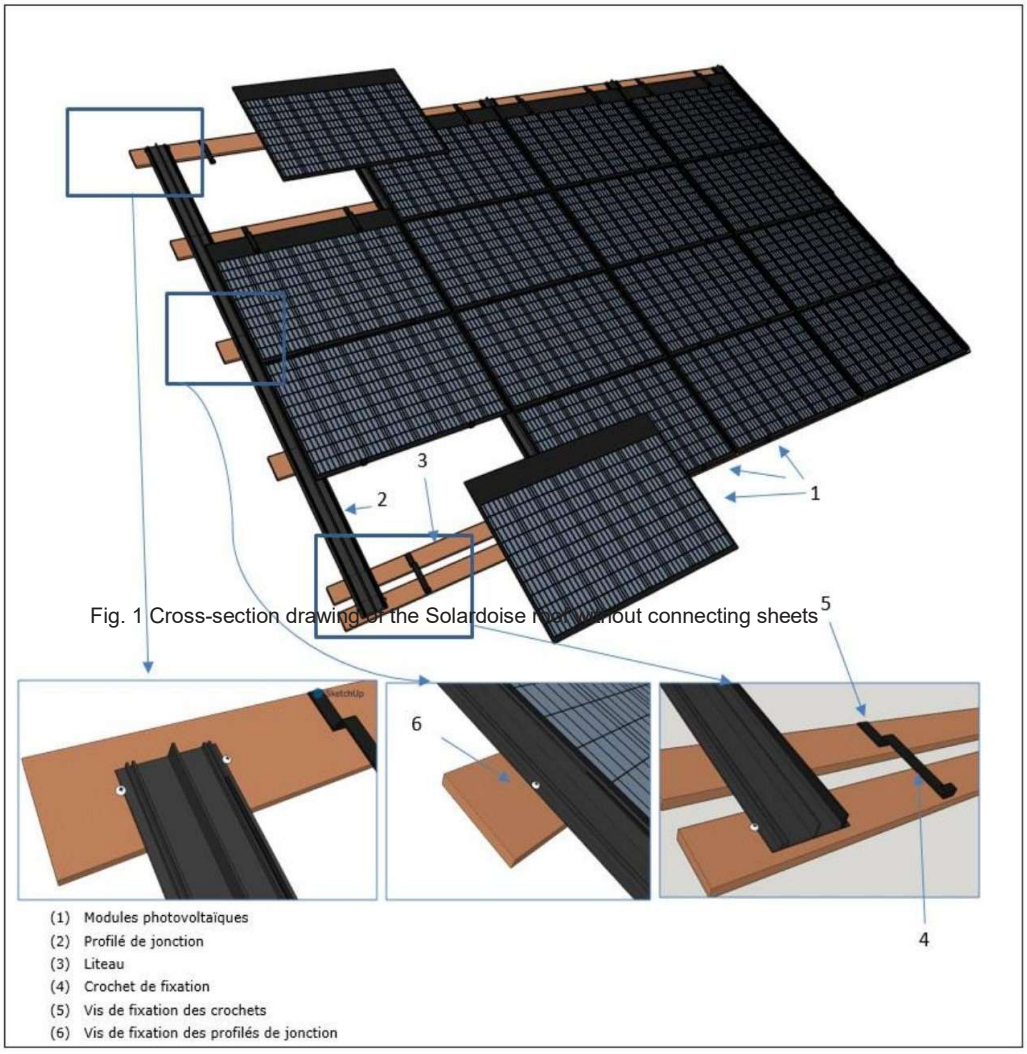


Fig. 1 Cross-section drawing of the Solardoise roof without connecting sheets

Function of gutters

Note that the gutters are only sized for the drainage of residual water flowing at the edge of the module. They must not be used as collector drain. It is therefore necessary to strictly ensure that the water collected does not
is not directed towards the flow profile but follows another suitable flow system.

2.2 Types of modules available

Solardoise solar panels are generally delivered in standard dimensions mentioned below:

Solardoise:

- 1316 mm horizontal x 1050 mm vertical (900 mm visible), safety glass 2x3.2mm.
- 1316 mm horizontal x 998 mm vertical (848 mm visible), safety glass 6 mm.

For perfect roof coverage, Solar Structure offers elements blind, at extra cost.

The maximum system voltage is 1000 V.

2.3 Undercover and lattice structure

The sub-construction consists of slats (slats and counter-slats) of well-dried wood with a humidity level of <15%. The slats must be straight to allow the alignment of the PV elements on them. The roof must also be at a right angle (e.g. edge strip to the lath).

Care must be taken to ensure that the sub-construction to be carried out by the client is in good condition, i.e. that the hooks can be fixed to the lath and resist a tearing force of at least 1,800 N (per screw), that the lattices are fixed to the respective counter-laths (two suitable screws per intersection point, carry out preliminary drilling lattices if necessary) and that the counterlattice is securely attached to the substructure. The pitch of the rafters must not exceed 50 cm.

The counter slats must have a minimum height of 20 mm to guarantee good rear ventilation. The lattice must have a minimum thickness of 30 mm and a width of 100 mm. The vertical distance of the lattice must be equal to the visible vertical part of the module. The lath surface must be flat and may need to be flattened in full compliance.

2.4 Qualifications and Certificates

A Solardoise roof is also suitable for areas with heavy snowfall (a snow load of 5,400 Pa has been tested).

The Solardoise PV roofing system has a general surveillance certificate construction sites relating to constraints due to fire from the outside (hard roof) in accordance with DIN EN 13501-5. Rainproofing for sites located in Central Europe has been successfully tested according to prestandard prEN 15601.

Solardoise PV elements meet the requirements of IEC 61215 and IEC 61730 standards.

3 Design and sizing

INDICATION

The actual dimensions of a roof, especially older roofs, may vary significantly from existing roof plans. Additionally, plans are often incomplete. It is therefore recommended not to rely solely on the plans but to take measurements of the roof taking into account adequate safety measures, in order to also document peripheral connections and other details.

3.1 Geometric sizing of the module field

The basis for planning a Solardoise solar roof is an exact plan showing the roof area to be covered (in normal projection and side view), including all roof cutouts such as attics, roof windows, chimneys and ventilation ducts. Any shaded surfaces must be marked on the plan as best as possible. possible with indication of the corresponding time (estimate). It is also necessary report the slope of the roof and its orientation (distance from the south).

After determining the available surface area, the designer will be able to estimate the number of Solardoise which will find place there and draw them on the plan. The dimensions Standard Solardoise elements manufactured by Solar Structure are **1316** mm x **1050** mm with a visible height **900** mm (August 2023 version).

Horizontally, the PV elements can be installed with a spacing of **10 to 30 mm** (as consistently as possible for the same installation). If possible, a planning deviation of approximately 20 mm should be chosen in order to be able to compensate for possible construction tolerances in both directions.

Vertically, an overlap of 150 mm must be taken into account for the determination of the height of the PV installation, see the following figure.

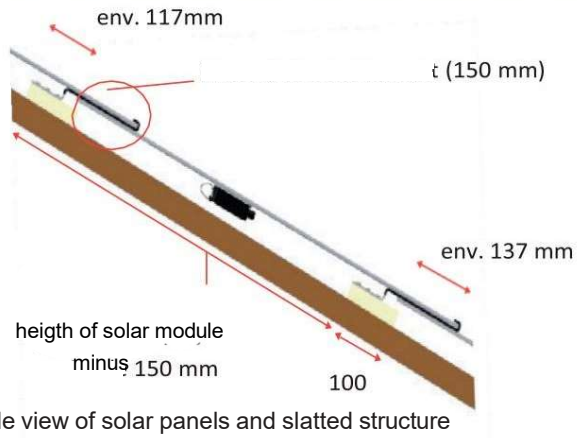


Fig.1 Side view of solar panels and slatted structure

Calculation of the size of a field of modules (from glass border to glass border)

Width of module field		**Height of module field**	
Number of solar panels (horizontal)	x 1316mm	Number of solar panels (vertical)	x 900mm
+ number of solar panels -1 (horizontal)	x 20mm	+ 1 x overlap X 150mm	
	= module field width		= height of module field

For example :

For a module field of 5 solar panels vertically and 7 horizontally, we obtain a size of the module field equal to:

Width of module field	**Height of module field**
7 X 1316mm = 9 212mm	5 X 900mm = 4,500mm
+6 X 20mm = 120mm	+ 1 X 150mm = 150mm
= 9,332mm	= 4,650mm

For peripheral connections, the following points must be taken into account:

- The contact points of PV elements with hard materials such as steel, concrete or clay should be avoided during planning.
- For roof cutouts such as roof windows, dormer windows and chimneys, a very exact measurement of the roof is essential.

  Deviations from connections such as tiles, etc. will need to be defined specifically for the project. Below you will find some sketches of examples (gap always measured from the glass edge of the solar panel) and others in the appendices:

- Distance from the top tiles: approx. -120 to +50 mm depending on the connection plate used
- Distance from the bottom tiles: from approx. 10 mm. in terms of the chosen connection plate
- Distance from the tiles laterally: from approx. 30 mm.
- In case of ridge with half-round ridge: approx. 150 mm, up to the finial level of the lattice, or depending on the connection plate used
- In case of ridge with strakkort style ridge: approx. 300 mm, up to made at lath level

- In the case of an edge strip with a raised edge board: from 15 to 35 mm to from the interior edge of the raised fascia board
- In the case of an edge strip without a raised edge board: maximum overhang 50 mm. Use this variant only in charging zone 1 regions in wind.

3.2 Electrical Safety

- Contact with electrically active parts of a PV module such as terminals can result in burns,
- sparks and lethal shock whether the PV modules is connected or not.
- Do not connect the PV modules directly to the loads since the variation of the output power depending on the solar irradiation causes damage for the connected load.
- Turn off inverters and circuit breakers immediately, should a problem occur.
- Do not shade the PV module. The shaded cell may become hot (hot spot phenomenon)
- which results in solder joints peeling off.
- Under normal conditions, a photovoltaic module is likely to experience conditions that
- produce more current and/or voltage than reported at Standard Test Conditions. Accordingly,
- the values of Isc and Voc marked on this module should be multiplied by a factor
- of 1.25 when determining module voltage ratings, conductor capacities, fuse sizes and
- size of controls connected to the module output.
- In case of series connection, the maximum open circuit voltage must not be greater than the specified maximum system voltage (The maximum system voltage of modules from our
- company is 1000V). The voltage is proportional to the number of series. In case of parallel connection, please be sure to take proper measure (e.g. fuse for protection of module and
- cable from over current, and/or blocking diode for prevention of unbalanced strings voltage)
- to block the reverse current flow.
- The parameters including Pmax/Voc/Isc/Vmp/Imp on the black label are nominal value.
- Please refer to the electrical properties of the various types of modules attached to this manual.

3.3 Electrical sizing

Once the geometric design is completed, an experienced electrician or solar system designer should undertake the electrical design.
Professional knowledge in the field of photovoltaic power generation, electro technical regulations and inverters is required.

Solardoise elements are normally mounted in series. Therefore, the electrical voltages of the different solar panels add up. Their maximum admissible voltage is 1000 V. The system voltage chosen must be suitable for
the input range of the inverter.

In the case of fairly large installations, the PV elements are distributed over several fields, the electrical plan (wiring) of which is drawn on a plan. When designing the circuit, care must be taken to minimize inductive loops, i.e. to lead drivers departing and returning as closely as possible. The following figure shows a field plan.

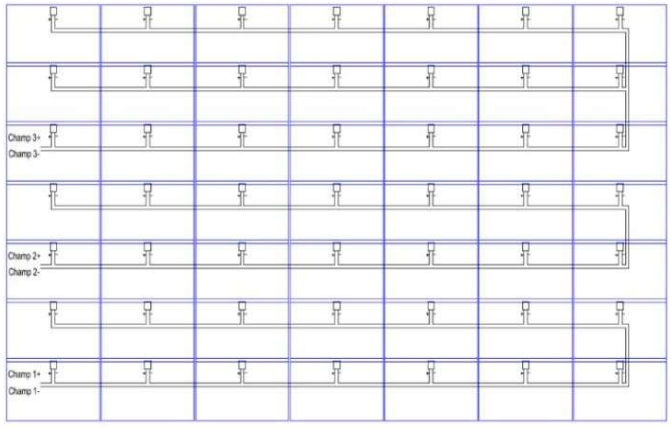


Fig. 2 Example of a field plan

3.4 Lightning rod, earthing

Solardoise solar panels are without a metal frame. Direct earthing is therefore not possible and is not required by law. In general, a building is not subject to the obligation of lightning protection due to the implementation of a PV installation; local regulations must be observed on a case-by-case basis. The use of lightning rods mounted directly at the roof outlet is recommended.

If a lightning rod device is already present, the PV installation must be integrated in accordance with local regulations in force. Protective distances between the PV elements in relation to the sensor or spark gap elements of the lightning rod installation reduce the risk of damage to Solardoise solar panels

in the event of a lightning strike (direct or nearby) on the installation.

3.5 Peripheral connections and fittings

INDICATION

Rear ventilation

When assembling the drip edge and ridge connection, it is important to ensure that good ventilation, it must therefore be achieved with the largest possible ventilation sections.

Peripheral connections are carried out by a carpenter. It is by example of the edge band, the ridge, the drip edge, the insect protection and the covering sheet, the roof connections, chimneys, dormer windows, etc.
The connection to normal roofing materials must be preceded by control and planning, preferably by calling on a professional responsible for execution. The choice of connection materials will be made according to the materials used for roofing (roof windows, skylights, etc.), e.g. zinc-titanium materials, copper, galvanized sheet metal, etc. Some examples of connections peripherals are sketched in the appendix.

INDICATION

Edge strip

Connection of an edge strip with a cantilevered PV element *(see page* 57) is only permitted for wind load zone 1 and also requires separate statics proof.

3.6 Roof avalanche protection

Snow generally slides quickly on Solardoise solar panels, especially on slopes of more than 30°. However, it cannot be ruled out that a large amount of snow will accumulate on the PV system in regions where it snows a lot, which would lead to a risk of a dangerous roof avalanche which would slide off the roof at an unpredictable time. It must be checked on a case-by-case basis whether safety measures must be taken, for example the use of snow guards or a ban on passage.
temporarily in the danger zone.

⚠ AVERTISSEMENT

Roof avalanches can fall a few meters from the edge of the roof tear and put passers-by in danger.

In places with public passage (street or forecourt for example), snow guards or a ban on passage are obligatory. On private land, it is possible to minimize the risks of a spontaneous roof avalanche by using a de-icing device allowing controlled sliding of the snow.

3.7 Execution documentation

The following documentation is required for the execution of the project, it is to be created or provided by the people responsible for the implementation.

- Plan of the roof or lattice in top view and side view: position of the lattice (and counterlattice if necessary), vertical gutters (glass fiber reinforced plastic profiles) as well as connections
  peripherals, cutouts, etc. To be able to assemble the Solardoise substructure as accurately as possible, all measurements must be taken from the same fixed point (see the figure on *page* 24).
- Field distribution plan (see the figure on *page 21)*
- Electrical sizing of the system (inverters, fields, etc.) It is possible to achieve this using software for sizing inverter manufacturers.
- Connection control table: a connection control table
  is useful for installation, electrical functional testing and troubleshooting. It includes the expected no-load voltages of the
  fields installed at different temperatures and allows a plausibility test of the measured voltages. An example is given in the appendix.
- Detailed drawings of the peripheral connections present (bank, drip edge, ridge, roof window, tiles, etc.).
- Documentation of the components and equipment used.
- Electrical diagram, low and high currents
  - Complete equipment list (tool and system hardware); cf. chapters *5.1* and *7.1.*

4 Solardoise work instructions

Lengthening of the rails and installation of EPDM Solardoise seals

(Glass reinforced plastic profiles, GRP)

4.3 Purpose

This work guide describes the process and quality guidelines for making the profiles of the Solardoise solar mounting system.

4.4 Field of use This work guide is intended for all personnel who use solar system profiles Solardoise.

4.5 Responsibility

Responsibility lies with the trained personnel responsible for execution.

4.6 Means of work

Documents:

- Technical drawing of the production order with position of EPDM joints

Materials :

- Solardoise GRP rails (glass fiber reinforced plastic)
- EPDM rubber seal, 875 and 1005 mm, **the longest being for the 1st row of panels at the bottom**
- Liquid glue (Loctite® 480)
- Bubble wrap
- Stretch film
- Adhesive tape (recommended: tear-resistant tape)

Tools :

- Meter (8m)
- Carpet knife
- Robust scissors
- Jigsaw with hard metal blade
- Circular saw with hard metal blade
- Emery paper
- Square
- Tracer
- Rubber hammer
- Tool for driving EPDM Borflex gaskets (bar with a groove conical)

Protective gear :

- Work gloves
- Protective clothing
- Respiratory protection
- Earplugs
- Safety glasses

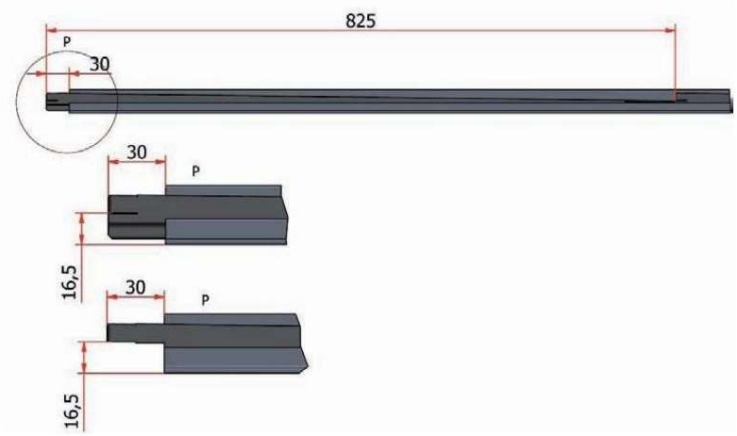
4.7 Execution of the work

4.8 Installation of rails to join 2 rails “end to end”

To join rails, a Solardoise joint is necessary.

Prepare the top rail:

1. Allow the joints to protrude 30 mm downwards.
2. Extend the cutout to the rail and cut the lower part.



The **bottom rail** should be clean with the joints at its top edge.

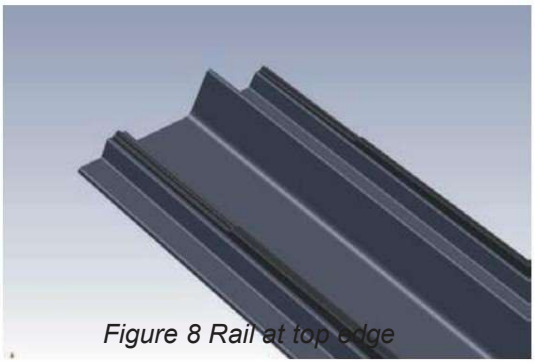


Figure 8 Rail at top edge

4.9 Assembly of connections for junction profiles

The maximum length of the junction profiles is 8.75 m.

If longer profiles are required for an installation, two profiles can be connected together.

On the lath where the connection will be located, a 120 mm lath must be provided. Profiles, manufactured specifically for a project, can be supplied.

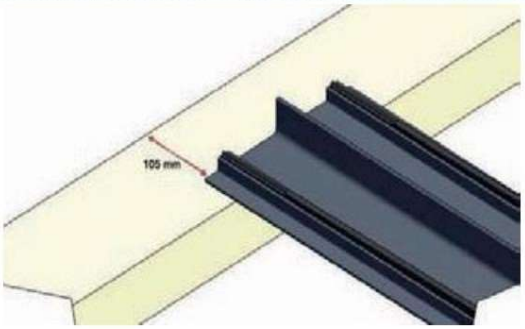


Fig. 1 Alignment of the slat with the upper end of the profile in the center of the field

1. Mount the lower profiles a) Align

the upper end of the profile rather in the center of the roof see figure 1:

• The distance from the upper edge of the slat to the upper end of the profile is 105 mm.

Center alignment is recommended since roof batten tolerances and dimensions can vary greatly.

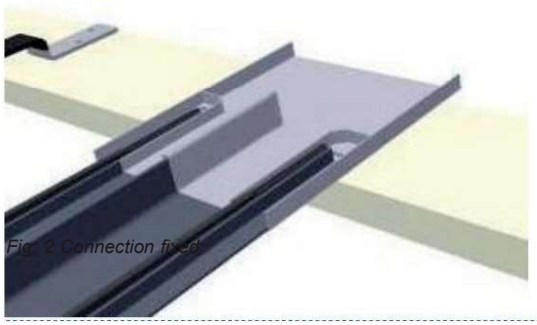


Fig. 2 Connection fixed

2. Attaching the black profile with the profile connector (shown in light gray in Figure 2).

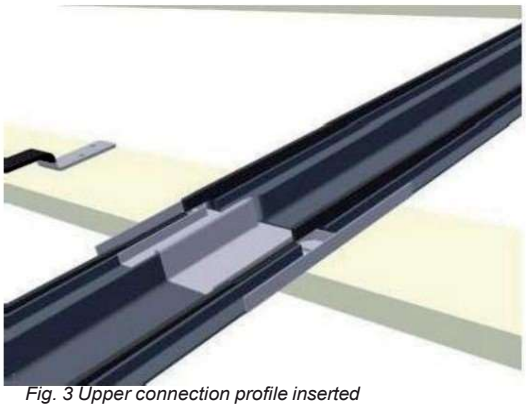


Fig. 3 Upper connection profile inserted

3. Inserting the end of the upper junction profile into the fitting.

Noticed:

The connection is simply installed and will not be fixed

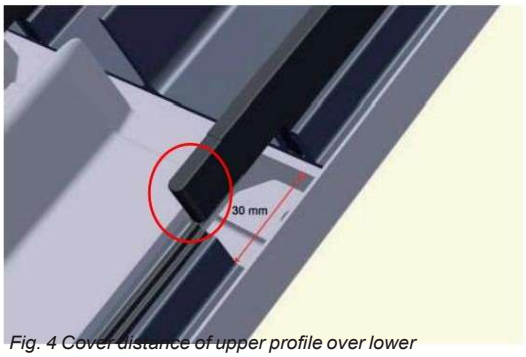


Fig. 4 Cover distance of upper profile over lower profile

4. Align the upper profile

The profile is positioned and fixed to obtain an overlap distance of 30 mm over the bottom profile.

• The end of the rubber support of the upper and lower profile are joined together (red ellipse)

The rubber support of the upper profile extends beyond it by 30 mm.

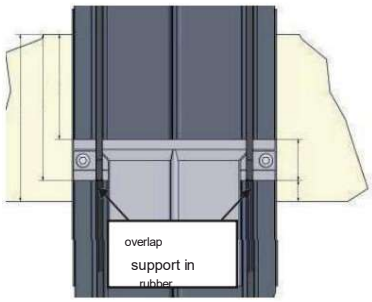


Fig. 5 Vertical fixing of fittings

5. a) Secure the connection:

• Screw the profiles by centering them (distance 30 mm).

• Secure it to the slats with 2 stainless steel wood screws.

Note: A centered fixing allows possible construction tolerances and extensions to be taken into account

thermal profiles of the profiles.

Check the position of the profile and the notch of the rubber support.

The upper end of the lower profile must, according to Figures 5 and 6, be located 105 mm from the upper edge of the slat (see also Fig.1)

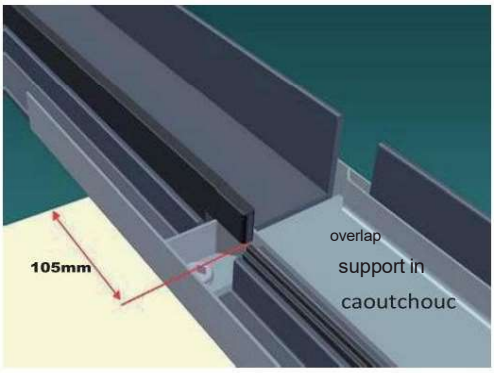


Fig. 6 Cover distance of upper profile over lower profile

5. b) Fix the connection to the edge strip Right and left edge strip

• Proceed as 5 a) but this time fix the connection only with a screw

Check the position of the profile and the notch

• The end of the rubber support of the upper and lower profile are joined together (red ellipse) and continue in the same way as 4

INDICATION

If more than two junction profiles are connected together, the under-roof must be adapted for greater stress – with a waterproof under-cover without a joint – and the evacuation of water through the gutter.

The bottom channel should be the maximum length possible, to minimize the amount of water running off the fitting. The upper profile segment can also be provided for a single Solardoise element.

Example with 3 juxtaposed profiles: • Lower part: profiles for 10 Solardoise elements • Central part: profiles for 10 Solardoise elements • Upper part: profiles for 1 Solardoise element

INDICATION

It is advisable to have a specialist check that the connection is not blocked, for example by leaves or pine needles, and, if necessary, clean it.

5 Assembly

Skill

The assembly of the lattice is generally entrusted to a carpenter and is carried out according to the rules of the art. Mounting and connecting the inverter is the task of the electrician.

INDICATION

Number of slats

One more row of latticework is required compared to the number of rows of solar panels planned.

5.3 Tools and auxiliary means required for mounting the Solardoise installation

- Hook mounting template (optional, on request)
- Cordless drill with torque limiter
- Chalk line
- Metre
- 5 mm drill bit (for glass fibers)
- Special tools for mounting PV connectors on cables
- Diagonal cutting pliers, stripping pliers

- Insulating tape
- Labels for cable identification
- Indelible pens to write markings (weather-resistant) on the lattice and labels
- Multimeter (10 A min)
- DC load disconnector suitable for control measurements
- Auxiliary test lead

It is also recommended to bring

- Wood saws
- Jigsaw with hard metal blade
- Suitable work gloves made of leather or with rubberized palm
- Shoes with soft rubber sole

As a general rule, it is recommended to bring a universal tool box.

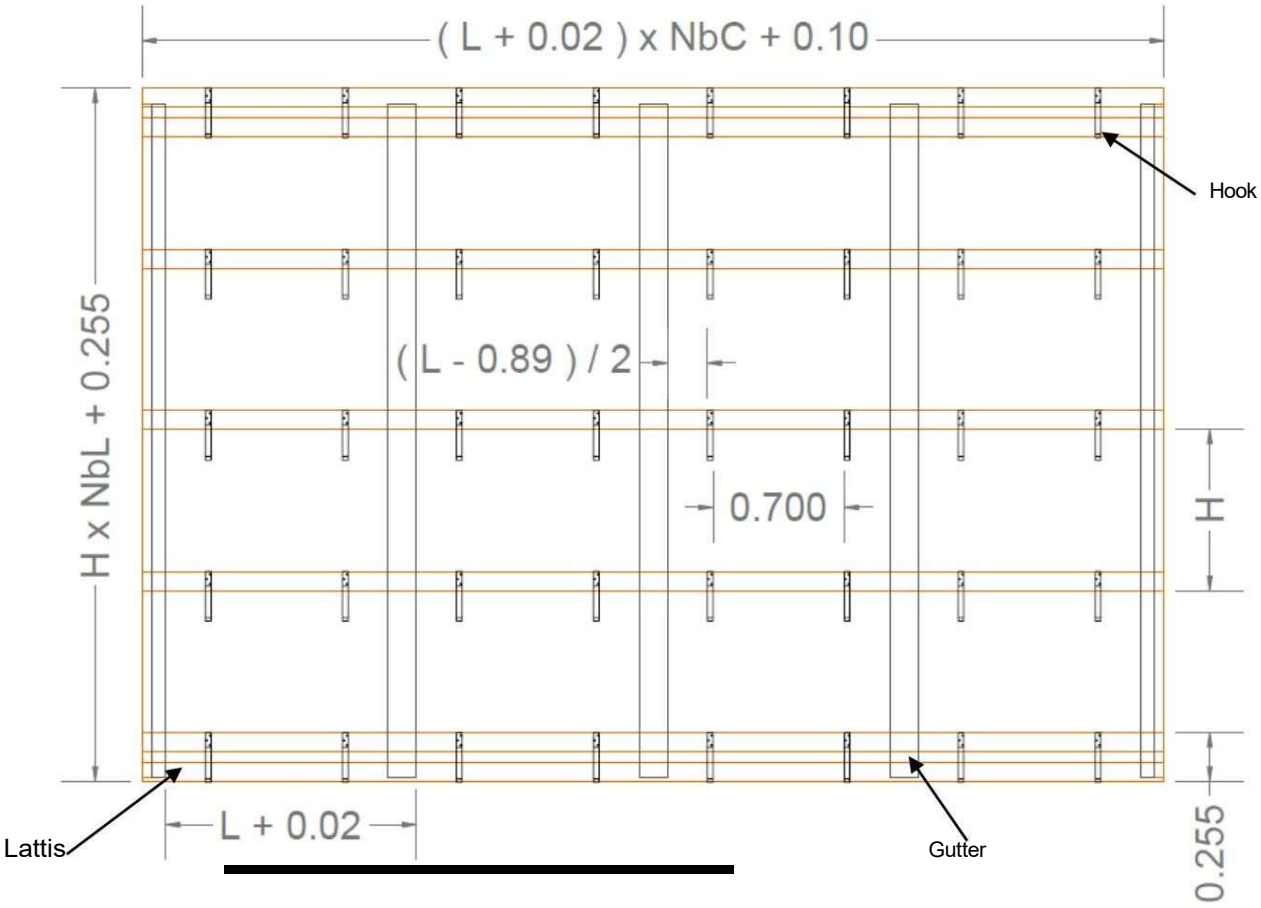
INDICATION

These assembly and installation instructions describe the preferred assembly, from top to bottom.

5.4 Assembly step 1: checking the lattice and connections

The first assembly step consists of checking the dimensions of the lattice made by the project owner. The tolerance for the gap between slats is ± 2 mm in relation to the lower or upper roof slat, as well as ± 1 mm between different slats. The roof slats must be vertical to the edge strip or connection to other roofing materials. The space available in width for the module field must also be suitable horizontally. PV elements cannot be cut!

The lath must be fixed at each point of intersection with the counterlath (recommended minimum thickness 20 mm) using two suitable wood screws 6 x 70 mm min.



L = width of module

H = heigth of visible module

NbC = number of columns

NbL = number lof lines

Fig.1 Lath

Connections to the edge, ridge and drip edge must be defined specifically for the project; normally the roofer is responsible for this. You will find examples in the appendix. If a cover sheet is used at the drip edge, it must be installed before starting the assembly of the components of the Solardoise system.

INDICATION

Relative position of module field

The glass edge of the bottom PV module extends beyond the bottom edge of the bottom slat by 137mm downwards. The relative position of the upper edge of the top slat depends on the type of hook used.

5.5 Assembly step 2: transfer of positions

The position of the gutter is transferred to the lower and upper slats, to the right or left of the gutters, following the plan (see the following figure). Between the marks, a line is drawn with a chalk line to align the profiles.

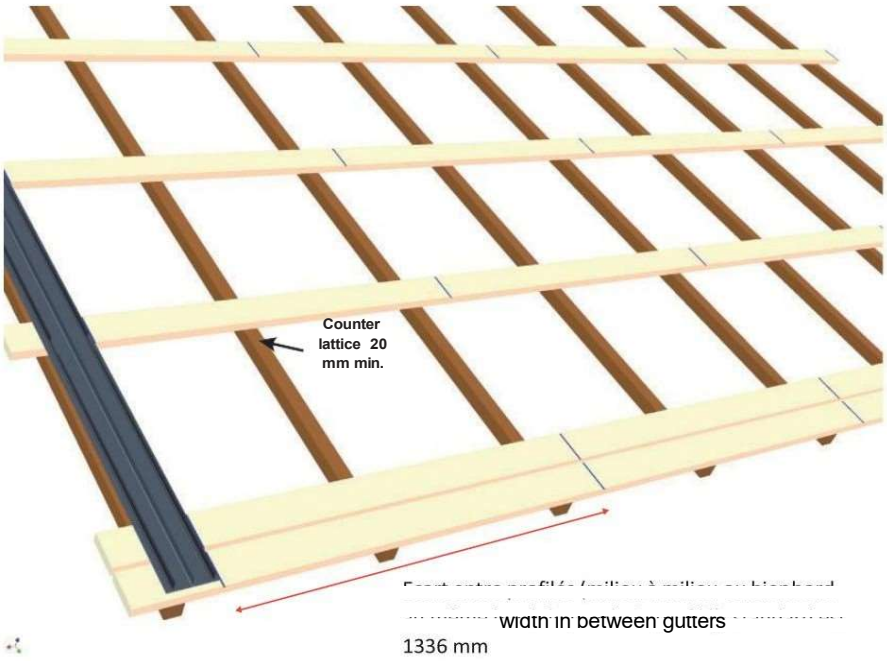


Fig. 2 Position of gutter grooves (blue with scribing rope)

5.6 Assembly step 3: assembly of gutters

INDICATION

The screws necessary for mounting the profiles (screws for chipboard panels with stainless steel plate, 6 x 35 mm) must be supplied by the installer. Do not use countersunk head screws.

The gutters are only attached to the two slats closest to the center of the profile in order to reduce thermal stress. For this purpose, holes are drilled on both sides in the lips (but not in the wood) and the profiles are fixed with 4 screws to the lattice (see the following figure).

On the lowest and highest lattice , the profiles are only held with screws or nails on the side so that the head holds the profile without exerting great pressure. (see drawing)

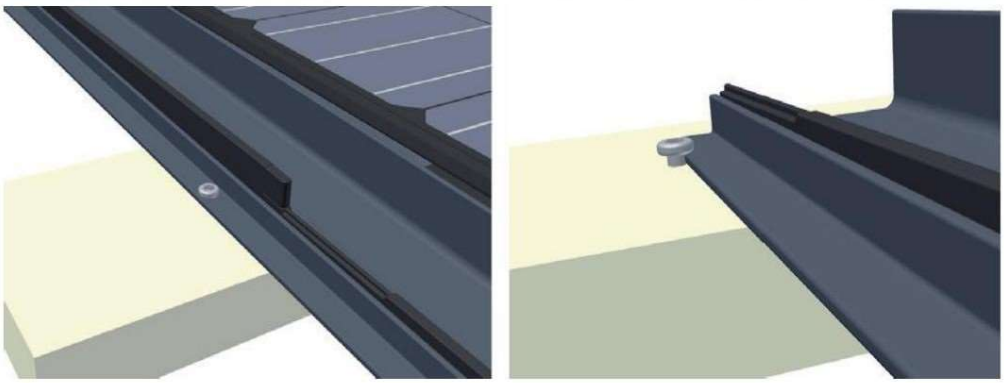


Fig. 3 Center fixing, side fixing

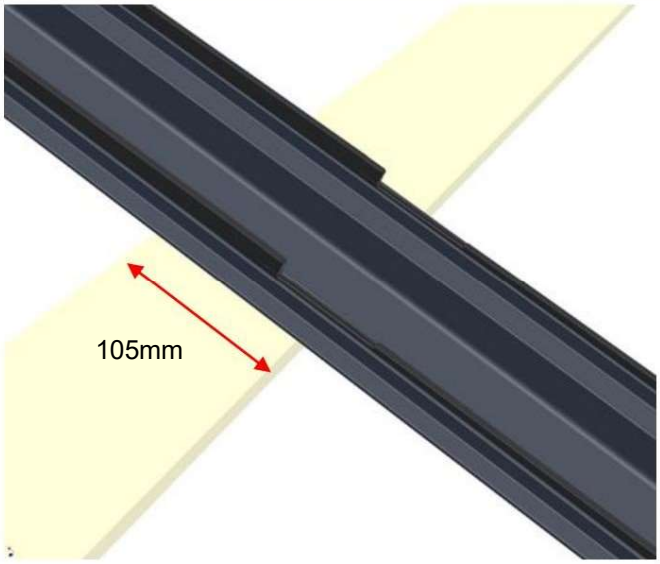


Fig. 4 Vertical positioning of the gutter

The position of the rubber supports in relation to the lattice is decisive. The joint is 105 mm below the upper edge of the respective lath, see figure at top.

INDICATION

Edge plate

If an edge board with sheet metal is used to connect to the edge strip (fig. 4), it is advantageous to install it directly after installing the side gutters.

5.7 Assembly step 4: Laying the field cable

INDICATION

Field cable

The cable ends must be clearly marked (legibly) with field number and polarity. It is useful to write the field number
corresponding with its polarity to where the end of the cable will be on
the undercover. Cables must be ordered with sufficient length.

The field cables are laid according to the field distribution plan *(see page 21)* and temporarily fixed to the lattice at the corresponding position by the respective end (+ or -). Ideally to the lattice which is located under the center of the PV element to be connected.

The section of cable between the connected panel and the roof cutout is slipped into the across the lath and counterlattice. If the PV connectors compatible with the elements
PV are not already made, they must be mounted on the panel side ends.

On the other side, the cable ends will be made according to
the application, for example for connection to the terminals of an electrical box (without connector) or by means of connectors to inverters.

In any case, appropriate measures must be taken to avoid any
electrocution.

⚠ ATTENTION

As soon as the solar panels are connected together,
the cable harness is under high voltage! Cable ends which cannot be connected to the respective terminals before switching on the

Solar panels must be insulated in full compliance.

Appropriate safety measures must be taken
for work on open cable ends. It would be ideal to only work when it is dark (the solar panels are off).

It is absolutely necessary to ensure correct polarity.

INDICATION

Important :

Interventions in and on the electrical box and inverters must only be carried out by a
qualified solar electrician.

Only the electrician is authorized to connect the cable in the electrical box!

5.8 Assembly step 5: mounting the hooks

The hooks are attached to the lath with three 6 x 35mm stainless steel flat head wood screws, two hooks per standard module.
For vertical, the upper edge of the two outer hooks is
aligned flush with the upper edge of the lath, for horizontal, distance

⚠ AVERTISSEMENT

You will have to be careful not to pass the screws too tightly, as they will not plus attached sufficiently securely to the lattice. The torque limiter of the screwdriver must be adjusted accordingly! If the screws have been overtightened or the screw heads burst, it is necessary to shift the hook horizontally (as little as possible) to secure it.

compared to the profile is approx. 200 mm.

Place the template on the lattice, with the two brackets resting on the top of the lattice; also reference the guide on the left side of the gutter
asked previously.
Place the two legs in the grooves provided for this purpose. Screw these two legs with the stainless steel screws.
Then, release the template by lifting upwards and pulling downwards.

ATTENTION
If the hooks are not mounted precisely, the PV elements are hung at an angle and can touch each other – Be careful glass breakage ! Assembly is made more difficult.

The peripheral connections at the level of the drip edge and, preferably, at the level of the edge strip (e.g. with edge and drip plate, general roofing work) must be completed before installing the PV elements.

5.9 Assembly step 6: installation of PV elements

The Solardoise elements are installed from top to bottom so as not to have to stand on the elements and to be able to carry out the wiring more easily.

You must first install the element of a branch which is connected to the branch cable. As a general rule, ensure correct polarity when connecting to the next element.

ATTENTION
There is a great risk of glass breakage if the edge of the glass on glass, metal or stone/concrete.

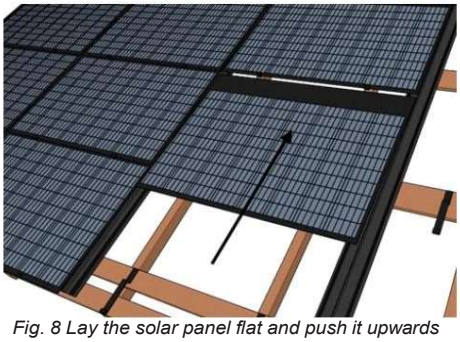
Place the PV element to be installed, placed on the upper edge, on the rubberized supports below the element placed higher.

Avoid any contact between glass/glass or glass/metal, risk of glass breakage!

Fig. 6 Placement of the solar panel

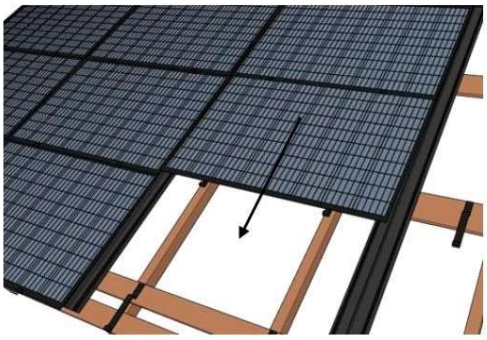
Connect the connectors together until they click (audibly).

Fig. 7 Connecting connectors



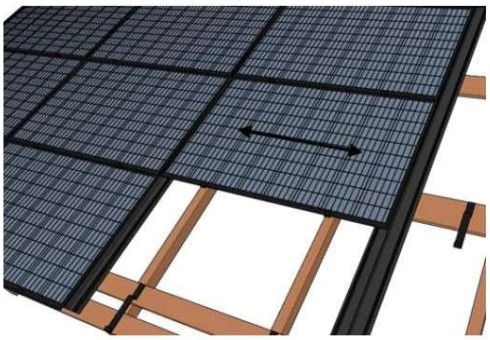
Lower the solar panel and carefully push it as flat as possible under the hooks of the element above

Fig. 8 Lay the solar panel flat and push it upwards



As soon as the shank of the hook underneath is visible, the solar panel is pulled down and anchored in the hook.

Fig. 9 Pull down the solar panel pushed up



If necessary, adjust the horizontal position carefully.
Absolutely avoid hitting the glass edges, do not use a lever.

Fig. 10 Horizontal orientation

5.10 Assembly step 7: checking the electrical circuit

⚠ DANGER

Branch current should only be measured if a suitable DC load disconnector is available.
THE
PV connectors should under no circumstances be used to interrupt
the branch circuit:

The direct current electric arc appearing when the connectors are removed destroys the contacts of the connections.

Dangerous high voltage is present! Eye damage and burns can also occur from electric arcs.

Branch control can only be carried out by personnel
qualified trained in electrical engineering!
Connect the solar panels only after the check has been completed.
electrical circuit to the inverter.

Open circuit voltage measurement

Open circuit voltage measurement of each series connection of a branch (field). If the measured values deviate significantly from the instructions, there is a circuit error or fault in a PV element.

INDICATION

The open circuit voltage approximately corresponds to the indication of the no-load voltage specified on the module data sheet multiplied by the number of solar panels mounted in series in the branch.

The no-load voltage depends on the temperature of the module, its value drops if the temperature of the module rises. It is normal that there are small differences in the measured values compared to the calculated standard value.

solar-structure@orange.fr - Tel: +33 (0)9 50 76 27 26
545 Rue Léon Jouhaux, 50000 SAINT LÔ - RCS Coutances 804 810 786

Short circuit current measurement

Measure the short circuit current of each PV string. If the measured values deviate significantly from the setpoints, there is a circuit error where a defect in a PV element.

INDICATION

The target values of the short circuit current correspond approximately to the short-circuit current indication on the plug module technique. The short circuit current depends on the intensity of the radiation that the module receives. Its value drops if the intensity of radiation diminishes. It is therefore normal to note differences measured values compared to the standard value.
The short circuit current should be approx. 90% of the value mentioned on the module technical sheet if the sky is clear and approx. 10% if the sky is overcast.

⚠ DANGER

Only an electrician approved for this purpose is authorized to carry out the connection to the mains. Local regulations must be observed in agreement with the responsible network operator.

6 Maintenance and cleaning

6.3 Maintenance

Even if automatic and continuous monitoring of the functions of a PV installation by means of a data logger data or other suitable device is recommended in As a general rule, a check of the installation itself should be carried out at least once a year. One of them is visual inspection (PV elements damaged or loose, hooks bent, connection plates damaged, cables, accessible connectors and earthing cable, etc.) as well as a thorough check of the terminals sufficiently plugged in for example, a measurement of voltages and system currents, proper functioning of protection elements, inverter temperature, etc. Anything beyond a visual inspection must be carried out by a qualified person. If in doubt, it is appropriate

seek advice from the installation supplier.

It is also necessary to take safety measures corresponding for interventions requiring possibly walk on the PV installation *(see section 8).*

6.4 Cleaning

Rain cleaning the Solardoise elements to remove dust and dirt is generally sufficient. Even snow slides by itself. If it is heavily soiled, wash it with plenty of water using a gentle cleaning tool (e.g. sponge).

Do not use cleaning products or abrasive means to clean Solardoise solar panels and do not splash water on the panels from below.

⚠ DANGER

Observe and follow the safety instructions and warnings in section *.1* during maintenance and cleaning. Maintenance and cleaning should be carried out by
a professional company.

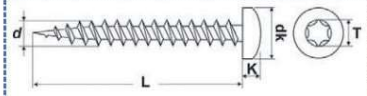
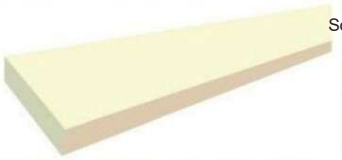
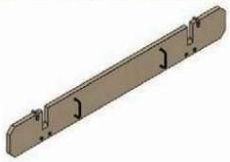
solar-structure@orange.fr - Tel: +33 (0)9 50 76 27 26
545 Rue Léon Jouhaux, 50000 SAINT LÔ - RCS Coutances 804 810 786

7 System components, materials and handling

7.1 Solardoise system components

Pos	Illustration	Designation
1		Mono Solardoise element; 1316 mm x 1050 mm, 240Wp
2		Mono Solardoise element; 1316 mm x 998 mm, 210Wp
3		Glass fiber reinforced plastic rail. Width 150mm For module 240: EPDM rubber seal 1005 mm (for the 1st panel at the bottom) EPDM rubber gasket 875 mm For module 210: EPDM rubber seal 978 mm (for the 1st panel at the bottom) EPDM rubber gasket 848 mm
4		Solardoise hook used to fix PV elements stainless steel partially covered with insulating resin, 30 mm x 262 mm

7.2 Solardoise: other components

Pos	Illustration	Art. no.	Designation
6		not provided by Solarstructure 6mm **Do not use good steel screw walk !**	Chipboard screws stainless steel panhead A2, 6 x 35 mm, (no head screws countersunk!) to attach the hooks and the gutters
7		not provided by Solarstructure	Lath, 30 x 100 to 120 mm maximum, sturdy timber with humidity < 15%; reduction of 1 x 20% max. per running meter
8		not provided by Solarstructure	Counter batten on rafter (minimum thickness recommended 20 mm)
9		Optional On demand	Assembly template hooks

7.3 Material specification of solar panels, gutters and brackets

PV elements consist of silicon solar cells,
extra-clear glass, EVA (ethyl-vinyl-acetate), a film for the rear
wall made of high-temperature synthetic material
resistor, copper solder strips, plastic junction box, semiconductor
bypass diodes, connection cable and connectors

(halogen-free).

The gutters are made of a plastic material
reinforced with glass fibers corresponding to fire protection
class E and are self-extinguishing.
Rubber mounts are made of EPDM rubber
weather resistant.

The hooks are made of steel (V2A) covered with insulating resin.
The components used are out of toxicity class.

8 Important additional information 8.1

Precautionary measures and access instructions

General precautionary measures

1.Do not use modules of different configurations in the same system.
2.Only compatible connectors can be used to connect components, that is, using the same supplier's connector of the same model, photovoltaic connector model and manufacturer, and module connectors should be matched with them. Connector Supplier: Taizhou Chuangda Electronic Co.,Ltd
Model: PV-TT02
3.Each module has bypass diodes to deal with the hot spot phenomenon caused by frontal occlusion, it can prevent the covered area from overheating and reduce the loss of modules output performance. For information on bypass diodes, please refer to the component material list.
Bypass diode Supplier: Taizhou Chuangda Electronic Co.,Ltd
Model：MK4045

Module Configurations (recommended)：

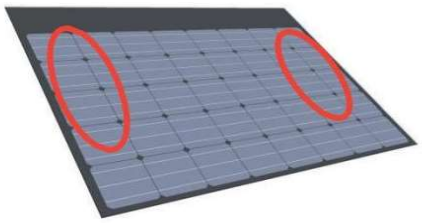
If without appropriate measures (such as fuses or anti diode), the maximum number of parallel strings should be just 1 string.
In the case of taking appropriate measures to prevent reverse current flow (such as the fuse to prevent a large current of the modules and cables, the anti diode to prevent the voltage imbalance between strings), there is no restriction to the parallel configuration.

- No contact of PV elements with metal parts such as hammer, screwdriver, steel flange, etc.
- If possible, do not wear tools attached to the belt when working near PV elements (destruction of the solar panels in the event of a fall on the glazing!)
- Do not damage the cables (danger of life! High voltage up to 1000 V possible); If necessary, have the cable with the damaged sheath replaced by a qualified person
- Never pull connectors under electrical load

Special measures to be taken in the event of an intervention requiring walking on the installation

- Only step on solar panels if it is absolutely impossible to doing otherwise
- Own protection: only work if roped, the length of free rope should be as short as possible
- Risk of slipping due to smooth surface! • Reduce loads (do not place yourself on corners, edges and hooks, for example)
- Be sure to wear soft, clean rubber soles (no gravel in furrows, etc.)
- Wear sturdy shoes with high heels or special ankle protection due to possible injuries in the event of broken glass.
- People weighing more than 80 kg should not walk on the solar panels
- Distribute the weight if possible over several elements
- Preferential access points according to the following figure (marked by ellipses)

Fig. 1 Preferential access points



solar-structure@orange.fr - Tel: +33 (0)9 50 76 27 26 545 Rue Léon Jouhaux, 50000 SAINT LÔ - RCS Coutances 804 810 786

8.2 Troubleshooting and replacement of elements

If irregularities appear when checking the voltage and current of the different branches, these irregularities must be remedied in order to guarantee safe and optimal operation of the installation. Defects can occur due to defective solar cells or panels, poorly closed connectors, cables (or ends of

cables) torn entirely or in part, from an incorrect number of solar panels interconnected, faulty wiring of the solar panels (fault in branch assembly), etc.

The branch control table serves as a reference when measuring voltage in taking into account the estimated temperature of the cells. When measuring current, a plausibility checks (comparison of different solar panels receiving the same radiation) can be useful.

In general, it is recommended to proceed as follows in case of voltage divergence: in open circuit measured in relation to the voltage set point according to the branch control table or clear difference in the short-circuit current measured in relation to the reference module or branch.

1. Rethink the assembly process for the corresponding branch. Follow the wiring plan, possibly recount the elements. Check the wiring as much as possible without disassembly. If the number is correct and you found no errors:

2. Open the branch approximately in the middle and measure the two halves. If one of the two halves shows differences from the expected values (current and voltage), repeat this procedure on that half of the branch until the faulty components or faulty link are found.

3. Replacement/repair of components or defect.
4. Control measure

⚠ DANGER

The connecting connector between solar panels should never be used as current disconnector or switch when measuring. Never cut the connector under load.

Do not reuse connectors that have been cut once as this power cut may have destroyed them.

8.3 Disposal

- Direct disposal as rubble is not permitted.
- Solar Structure is committed to recycling your solar panels.