



Crystalline photovoltaic laminates for network connection

SAFETY, INSTALLATION AND OPERATION MANUAL



ATTENTION!

This manual provides important information regarding safety, installation and operation of photovoltaic laminates.

Comply with the following standards.

IT IS RECOMMENDED TO REFER ONLY TO QUALIFIED PERSONNEL

General informaton

- Before installing, wiring and commissioning the laminates or performing maintenance, ensure to have well understood all the instructions regarding installation and safety.
- When installing, comply with all the provisions, directives, standards and local, regional, national and international standards in force.
- Installation and maintenance must be performed only by qualified and authorised personnel.
- The output power produced by the laminates can be greater than the specified rated output.
- According to the industrial standard, nominal values are detected with thermal radiation equal to 1000 W/m² on the laminate surface, 25 °C solar cell temperature and solar spectrum with relative air mass AM 1.5. Colder temperatures can considerably increase voltage and power.
- Reflection from snow, water or other reflecting surfaces can increase current and power generated by the laminate.
- Do not use mirrors or lens to concentrate solar radiations on the laminates.
- Light can cause different shades of colors on antireflection glasses, depending on laminates tilt, but this doesn't compromise the efficiency of the laminates itself.
- The laminates are intended only for outdoor operation.
- Installation is prohibited in laminates that come into contact, or complete or partial emersion, in fresh or brackish water.
- Use only equipment, connectors, cables and supports suitable for the photovoltaic system.
- For the application of a laminate comprised of separate pieces, a declaration must be made stating that assembly will be done on roofing material classified inflammable.
- In the event the panels waiting to be installed must be stored outdoors, place the panels always with the glass surface facing downwards and cover them so to prevent water stagnations.

Handling safety

- Do not touch in correspondence to the connectors, when handling the laminate.
- Do not stand or step on the laminate. This will void the guarantee.
- Do not drop the laminate or allow objects to fall on it.
- Ensure that the rear surface is not damaged or scratched.
- Do not place the laminate on a surface roughly.
- Do not disassemble, modify or adapt the laminate or remove any part or labelling. This will void the guarantee.
- Do not apply any paint or adhesive to the rear surface of the laminate.
- Never leave the laminate unattended if not properly fastened and without support.

- The laminates are made of tempered glass, however they must be handled with care.
- Laminates with damaged glass surface or with cracks on the rear-skin cannot be repaired and therefore must not be used. Any contact with the surface of the laminate or with the support may cause electric shock.
- Broken or damaged laminates must be handled with care and disposed of properly. Broken glass can have cutting edges and cause wounds; therefore, use appropriate equipment and protection devices.
- Work only under dry conditions and use only dry equipment. Do not handle laminates when they are wet, unless appropriate protective equipment are used.
- Prevent the infiltration of water inside the connectors.

Installation safety

- Any contact with live laminate parts, such as terminals, may cause burns, sparking and fatal electrical shocks, even if the laminate is not connected. Keep children or other inexperienced persons away from the system or laminate.
 - Do not perform installation in rain, snow, ice or strong wind.
 - If laminates are not installed at ground level, follow appropriate safety practices and use protection devices that avoid damage caused by falling of laminates and other safety hazards.
 - Photovoltaic laminates are not equipped with on/off switch. They can only be rendered inoperative by removing the front face from light.
 - When working with laminates in light, follow all provisions and standards regarding working with live electrical equipment.
 - Never disconnect electrical connections or unplug connectors while the laminate is in a closed current circuit.
 - Do not touch the electrical terminals or ends when installing the laminate or when the laminate is exposed to light.
 - Do not wear jewellery or metal accessories when performing mechanical or electrical installation.
 - Always use insulated equipment and rubber gloves approved for working during electrical installations.
- When working on sloping roofs comply with the relative safety standards and so set up appropriate safety and accident prevention measures.

Fire safety

- Refer to local authorities for guidelines and requirements for building or structural fire safety.
- Constructions and installation on roof may affect the fire safety of a building. Improper installation may contribute to hazards in the event of fire.
- It may be necessary to use components, such as ground-fault current circuit breakers, fuses and charging switches.
- Do not use the laminates near equipment or locations, where explosive gases can be generated or accumulated.

Electrical installation

- Laminates are destined for class A applications: dangerous voltages (IEC 61730: greater than 50 V DC; EN 61730: greater than 120 V), dangerous power applications (greater than 240 W) where general contact is expected. Safety qualified laminate via IEC EN 61730-1 and -2, and in both of these application classes they are considered in conformity with safety class II requirements.
- Avoid electrical hazards when installing, wiring, operating and maintaining the laminate.
- When exposed to light, one single laminate can generate DC voltage exceeding 30V. Contact with a DC voltage of 30 V or more is potentially hazardous.
- Do not use laminates of different electrical or physical configurations in the same system.
- The maximum no-load voltage of the system must not be greater than the nominal voltage of the laminate.
- In normal conditions, a photovoltaic laminate could encounter conditions that give rise to greater current and/or voltage in respect to standard component testing conditions. As a consequence, I_{sc} and V_{oc} values must be multiplied by a safety factor equal to 1.25 when voltage conditions, the size of the conductor, and the dimensions of connected command devices at laminate output are determined.
- When wiring the system, ensure that suitable cross-sectional areas and connectors are approved for use at the maximum short-circuit current of the laminate.
- Match the polarity of cables and terminals when making connections. Failure to do so may damage the laminate.
- The laminate is equipped with factory-installed bypass diodes located inside the junction box.
- Do not open or modify junction box in any way (cables cut or change of connectors). Opening, intervention or alteration of junction box will void the guarantee.
- Laminate protection must come via DC fuses, their nominal values are indicated in the voltaic products technical sheets.
- All laminates are equipped with cables and connectors (for cable and connector characteristics, see the relative product technical sheet).

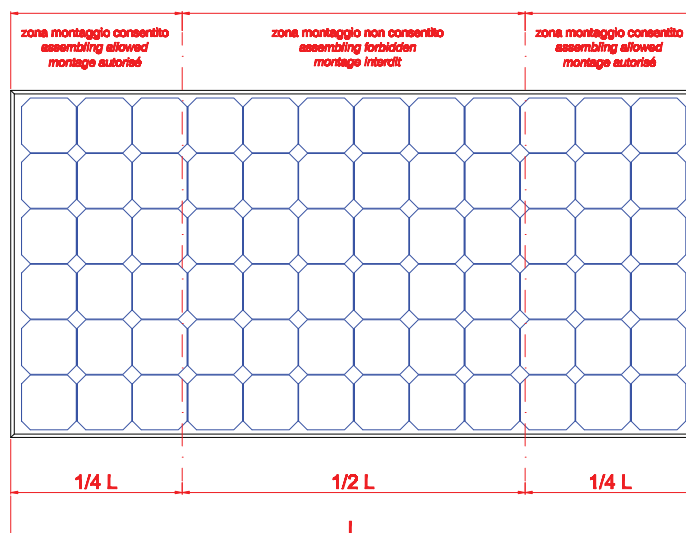
Grounding

- Panel grounding is not required for functional and electrical reasons. However, local or national regulations may require it.
- Laminates can be grounded by the fixing structure.
- The grounding cable can be fastened to the fixing structure with screws and stainless steel washers.
- Before fastening the screw, scratch the possible anodised coating around the hole on the fixing structure, in order to make electric contact operational.

Mechanical installation

- The laminates must be mounted so to be directly exposed to sunlight (orientated to south). To obtain the best performance, ensure there are now shadow areas, as even a partial shadowing can sensitively reduce the output power of the laminates and system.
- The optimum tilt angle of the laminates is about 30° in Central Europe (somewhat steeper in northern Europe, somewhat flatter in southern Europe). Differences reduce energy efficiency of the system.
- The minimum tilt grade is 6°. Grades lower than 6° will void the guarantee.
- The laminates must be securely fastened. Use supporting frames or mounting kits for photovoltaic applications.
- The laminates can be mounted at any angle either vertically or horizontally, but the fixing elements must apply on the long side at distances as per figure 1.
- Accumulating dirt (dry leaves, bird guano, mist, etc.) on the laminate surface can cause active solar cells to be shaded and reduce electric power.
- Provide an adequate ventilation space for cooling the rear of the laminates during mounting phase on roof.
- A clearance of min. 7 mm must be provided between all the sides of the laminates to allow high temperature expansions.
- Ensure that the laminate rear does not come into contact with foreign objects or structural elements, even when the laminate is under mechanical load, determined by the action of snow or wind.
- Ensure laminates are not stressed beyond the maximum load due to the action of wind or snow and are not subjected to excessive forces due to thermal expansion of the support structure.
- The maximum load applies to uniformly distributed wind or snow loads.
- The fastening indicated in figure 1 permits a maximum load of 5400 N / m² on the laminate surface.

Fig. 1



Is strictly forbidden to walk or step on the laminate, this will void the warranty.

Installation methods

- The laminates can be installed in different ways, on roof or ground, vertically or horizontally, but the fixing elements must be applied on the long side frame laminate at distances as per figure 1.

Operation and maintenance

- Attention! For safety reasons, inspection and maintenance operations must be performed by qualified personnel only.
 - Control regularly that laminates do not have damages on glass surface, on the backsheet, on the frame, on the junction box and on the external electrical connections. The lack of maintenance of the system will void the warranty.
 - Ensure electrical connections disconnected or corroded.
- Except in cases of heavy and large-area contamination (wet leaves, bird droppings, for example)
- Photovoltaic laminates can operate efficiently without ever being washed however, removing dirt from the glass surface can increase output.
 - Dust, dirt or other deposits on the coated glass surface can be removed and regularly washed with water.
 - Remove ingrained dirt on the coated glass using a micro-fibre cloth and ethanol or a commercially available glass cleaner.
 - Never use aggressive or abrasive cleansers or chemicals to clean the coated glasses.
 - Always wear rubber gloves for electrical insulations when performing maintenance, washing or cleaning laminates.
 - Maximum number of laminate configurations in series: string Voc value at a temperature of -40°C must not exceed 1000 V (as a function of the installation site)
 - Maximum number of laminate configurations in parallel: No more than two parallel strings can be operated, without an over-current fuse connected in series with the laminates.

Disclaimer of liability

- As the use of this manual as well as conditions, installation and operation methods, use and maintenance of the photovoltaic panels cannot be verified by the manufacturer, the producer will not be liable for any loss, damage or cost caused and/or connected to this installation, its operation, use and maintenance.
- The producer assumes no responsibility for any infringement of patents or other rights of third parties that may result from use of the photovoltaic products. No licence is granted by implication or otherwise under any patent or patent rights.
- The information in this manual is based on knowledge and experience and is believed to be reliable. However, said information including product specifications (without limitation) and proposals do not constitute a guarantee, neither express nor implied. The producer reserves the right to modify the manual, product, specifications or the product information sheet without prior notice.



RECYCLING AND DISPOSAL INFORMATION

According to art. 26 of the Legislative Decree of 14 March 2014, n. 49 "Implementation of Directive 2012/19 / EU Waste Electrical and Electronic Equipment (WEEE)" the crossed bin symbol on the equipment means that the product at end of life must be collected separately. The user must, therefore, bring the equipment at end of life to the suitable centers of separate collection of electrical and electronic waste, or return it to the dealer when purchasing a new equivalent device, in the ratio of one to one or consign it to the dealer free of charge on a one to zero if the case.

Old appliance suitable separate collection coming up to recycling, handling and environmentally compatible disposal helps to prevent negative impact on the environment and on human health and promotes equipment material recycling



SUNERG Solar s.r.l
Via D. Donini, 51- Loc. Cinquemiglia
Città di Castello (PG) - Italy
Tel: +39 075 8540018
Fax: +39 075 8648105
WWW.SUNERGSOLAR.COM