Pohjola Insurance

Safety regulations for solar power stations, S950

Your obligation to prevent damage, valid as of 1 January 2023

Welcome to the safety regulations!

In these safety regulations, we explain what your company must do and take into consideration to prevent damage to solar power stations.

In insurance contracts that have begun after 1 January 2023, these safety regulations are binding on your company.

ⓘ Read the regulations carefully. If you do not comply with the regulations, we may reduce or deny your insurance compensation.

These safety regulations are part of your insurance contract.

Your insurance contract consists of the policy document, insurance terms and conditions, safety regulations, and the general contract terms and conditions.

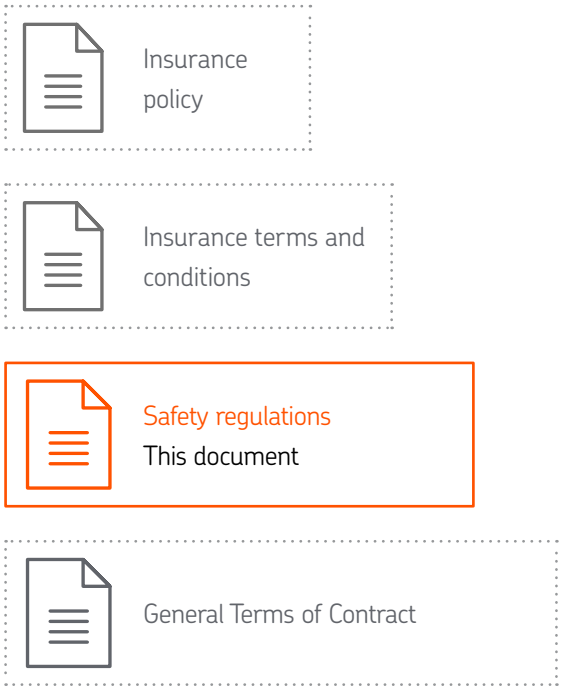
The **policy document** lists your company's insurance policies and the terms and conditions applicable to them.

The **insurance terms and conditions** describe the terms under which your property is insured.

These safety regulations describe your obligations to prevent damage.

Pohjola Insurance's general terms of contract contain general provisions related to your insurance.

We interpret the policy document, insurance terms and conditions, safety regulations, and general contract terms and conditions as a whole.



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1 Purpose of the safety regulations: prevention of damage to solar power stations

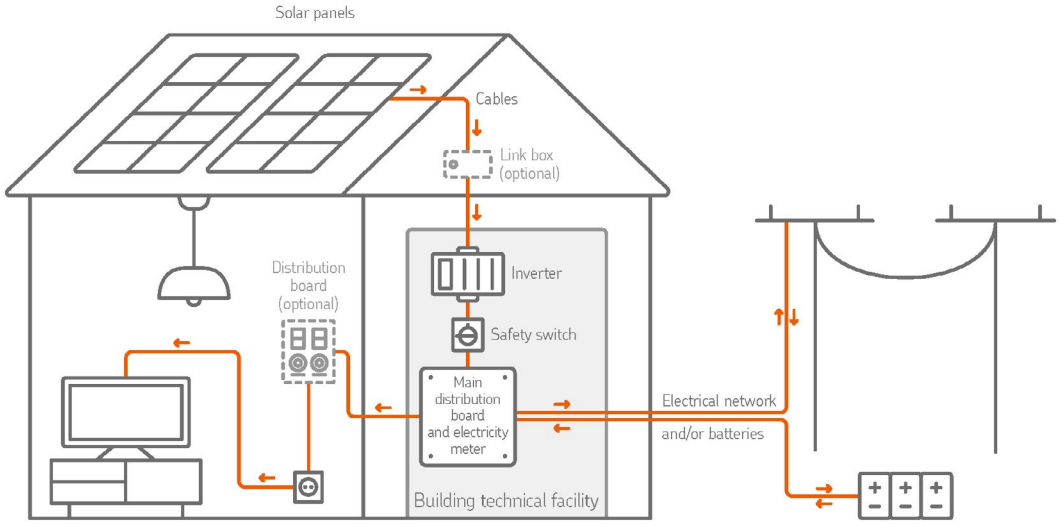
The purpose of these safety regulations is to prevent:

- damage to real property, such as fire and water damage, caused by solar power stations and their method of installation
- bodily injuries caused to maintenance staff or rescue authorities.

Your company has an obligation to ensure that

- the safety regulations are followed in all activities carried out by the policyholder or its equivalent
- those responsible for performing the work or otherwise responsible for preventing damage are familiar with the contents of the safety regulations.

2 Simplified diagram of the operation of a solar power station



Solar power stations are electricity generating systems that may pose a danger to persons working in their vicinity, such as maintenance staff or rescue authorities. The power station may also cause significant damage to other property, such as fires. For this reason, it is important to ensure the safety of the solar power station.

3 Planning the installation of solar panels and safety

Check the following in existing and planned solar power stations.

- ✓ **Comply with** the legislation on solar power systems, including regulations on electrical installations, fire safety and building legislation, and instructions issued by the solar power station's manufacturer and importer.
- ✓ **Ensure** that lead-throughs or fastenings do not impair the function of the roof, fire compartmentation, fire compartment wall or another fire seal.

Placement of the solar power station, arrays and panels

- ✓ **Ensure** that the roof can withstand loads, even after installing the solar power station. For example, the solar panels, arrays and additional weights weaken the roof's ability to withstand load.
- ✓ **Ensure** that the size of a single solar array on the building's roof does not exceed 20 x 20 metres, and that the arrays are spaced at least 1.6 metres apart.
- ✓ **Ensure** that the distance between the solar power station and the edges of the roof is at least 1 metre.
- ✓ **Follow** the fire safety compartmentalisation of the roof in the positioning of solar arrays, even if no fire compartment walls are in place.
    - Requirements for the fire compartmentation of roofs are given in decrees by the Ministry of the Environment. The roof may not be easily combustible by a fire in a neighbouring building, and the fire may not spread in the roof or its base in a manner that poses a hazard. Larger roof surfaces must be divided into sections of specific ares to ensure that the fire cannot spread freely through equipment installed on the roof.
- ✓ **Ensure** that the safety distance between panels is at least 2.5 metres from the edges of the fire compartment walls on the roof and at least 1 metre from smoke vents and other covered or uncovered apertures such as rainwater gullies and sunroofs.
- ✓ **Ensure** that the inspection and cleaning of the roof and rainwater gullies is possible safely after the panels have been installed.
- ✓ **Ensure** that statutory inspections and maintenance can be performed safely using maintenance walkways or access bridges, for example.

AC safety switch

- ✓ **Install** the AC safety switch in an accessible location.
- ✓ **Indicate** the location of the AC safety switch and rapid shutdown switch with signs.

Protection and positioning of cables

- ✓ **Protect** cables on access routes with casing
- ✓ **Protect** cables in locations that are exposed to UV radiation, snow, ice, temperature changes or other elements.
- ✓ **Ensure** that cables running through fire compartment walls are protected with fire-resistant casing.
- ✓ **Ensure** that cable fastenings are protected against external factors such as ice and snow.
- ✓ **Ensure** that cables do not prevent the function of the roof or cause a risk of tripping. Cables may not collect rubbish that prevents the evacuation of rainwater, for example.

Location of batteries

- ✓ **Follow** the battery manufacturer's instructions in selecting the space used to store batteries.
- ✓ **Ensure** the operation of ventilation, fire extinguishing, smoke extraction and fire compartmentalisation in the space used to store batteries.

4 Do-it-yourself inspections

- ✗ **Never** perform repairs or replacements of electrical components yourself. Always use a professional for electrical work.
- ✓ **Shut down** the power station with the safety switch (and RSD) when inspecting or cleaning the panels or performing other work in their immediate vicinity.
- ✓ **Inspect** the system visually at least once a year and after exceptional weather phenomena (such as storms, hailstorms, earthquakes). We recommend the inspection be performed every spring.
- ✓ **Inspect** and remove excessively large snow loads and accumulated rubbish, leaves and dry branches, for example.
    - For more information, consult the installer or manufacturer of the solar power station.
- ✓ **Repair** or commission repairs for any defects immediately and shut down the system if necessary.
    - For example, colour deviations on the surface of panels indicate a defective panel.
- ✓ **Remove** hazards from above the system and its immediate vicinity, such as snow and branches that may damage the system.

ⓘ Read more about electrical safety and periodic inspections in the S331 safety regulations on the prevention of electrical fires.

5 Our recommendations to improve the safety of solar power stations

ⓘ Below are measures recommended by us that you can take to avoid greater harm.

- ✓ **Install** Arc Fault Circuit Interrupters (AFCI) when installing or replacing the solar power station – for example, by means of monitoring the inverter's insulated space.
- ✓ **Ensure** that a thermal imaging of the solar power station is performed in connection with the thermal imaging of the property's main distribution board and subpanels.
- ✓ **Inspect** the waterproofness of the roof's lead-throughs annually.
- ✓ **Install** an MLPE (Module-Level Power Electronics) system that automatically monitors for disruptions. In the absence of an MLPE, monitor electricity generation levels regularly for possible defects.
- ✓ **Draw up** an electrical floor plan of the cabling if you are installing cables inside structures.
- ✓ **Install** a rapid shutdown (RSD) system.
    - The RSD is an effective feature for improving safety by restoring voltage in the panels to a safe level quickly in the event of an emergency, for example.
- ✓ **Connect** the solar power station's metal support structures and cable racks to equipotential bonding or earthing.
    - This protects the power station against lightning and disruptions in the electrical network, for example.

- ✓ **Keep** the main electric diagram of the solar power station near the main distribution board or distribution board.
- ✓ **Install** signs and warning labels on the solar power station's fire alarm central panel and main distribution board and along the access routes to the roof.
    - This improves the safety of personnel, maintenance staff and rescue authorities.
- ✓ **Prevent** unauthorised persons accessing the roof.
- ✓ **Install** the solar power station separately from the building. A solar power station installed separately is always safer than one located in the building.
- ✓ **Request** a service and maintenance plan from a technician or professional, especially for solar power systems of more than 35A.
    - You can use the plan to regularly monitor the system's operation and take care of various maintenance measures. The plan also takes into account requirements of the law, standards and manufacturers' instructions on annual maintenance and periodic inspections.

6 Glossary

The AC safety switch shuts down the power supply from the solar power system to the building's electrical network. The safety switch is located between the inverter and main distribution board.

ⓘ NOTE! The AC safety switch does not cut off the voltage from the solar panel arrays (see RSD)

The **AFCI** (Arc Fault Circuit Interrupter) system is used to monitor electricity for electric arcs and shut down the inverter if necessary. In electrical systems, arcs caused by issues such as faulty components can pose a major risk of fire and bodily injury.

Alternating current (AC) is the form of current used in the national grid. A normal electric socket provides an alternating current (AC). Some batteries have an integrated DC/AC inverter that allows electricity from the batteries to be used in the building.

The **array** is a collection of connected solar panels.

The **DC/AC** inverter converts a direct current to an alternating current suitable for the electricity network. If power supplied by the batteries is used in equipment that uses a standard electric socket, a DC/AC inverter is needed.

The **DC switch** shuts down the power supply between the inverter and solar panels. The DC switch may also be integrated in the inverter. If you want to shut down the system, cut off power first from the AC safety switch and only then the DC switch due to the risk of electric arcs.

Direct current (DC) is the current received from panels and batteries. It typically converts to an alternating current by means of an inverter.

Distribution board or fusebox. The current is supplied to distribution boards through the main distribution board. In residential buildings, distribution boards are typically located inside apartments. The distribution board may also be integrated with the main distribution board, in which case there are no separate distribution boards.

Earthing means connecting exposed parts of an electrical device to the ground to ensure that voltage between the device and the ground remains small, even when the device's insulation fails.

The **electricity meter** is a device used by electricity providers and transmission companies to monitor the amount of electricity used in the property. It is typically located in the main distribution board.

Equipotential bonding means the electrical bonding of at least two objects that conduct electricity.

The **main distribution board** is often located in the building's technical facility. Electricity produced at power stations is supplied to properties through the grid and connected to the building's main distribution board. Through the main distribution board, electricity is distributed to the building's electrical equipment, possibly through distribution boards.

The **main electric diagram** shows relevant information about the property's main distribution board, such as connections, components, etc. and used by professional electricians for inspections, for example.

The **micro-inverter** optimises current and voltage in generating electricity in individual panels. As a system with a low DC voltage, it minimises the risk of electric arcs. The micro-inverter is an alternative to a power optimiser.

MLPE (Module-Level Power Electronics) is used to track operation at the level of individual panels, including automatic monitoring of defects and per-panel efficiency. MLPE systems include micro-inverters and power optimisers.

MPPT (Maximum Power Point Tracker) controls the voltage and current in the panels to achieve optimal efficiency. The MPPT is located in the inverter, micro-inverter or power optimiser.

The **power optimiser** is an inverter that is installed separately or integrated with several panels. It is used to optimise the per-panel current in different conditions. Power optimisers are equipped with many safety-enhancing features.

The **RSD** (Rapid Shutdown) system is used to shut down the solar power station and lower voltage in the components to a safe level. RSD is typically implemented using an MLPE device.

ⓘ The RSD system does not entirely remove the voltage from the system. In many countries, installing an RSD system is mandatory for the safety of the fire authorities.

By following these regulations, you will ensure the safety of your solar power station and avoid unpleasant surprises in the event of an insurance claim.

Thank you for taking the time to read these safety regulations!

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