Solar systems from Schweizer

Leaflet In-roof PV mounting system Solrif
Lightning and surge protection, equipotential bonding

Introduction

In Switzerland, Austria and Germany, the need for lightning and surge protection measures depends on the specific protection requirements of a building. These requirements arise in particular from:

- the size of the building
- the geographical location
- the intended use
- the probability of a lightning strike

The necessary protection measures must be agreed with the relevant fire safety authorities, the building insurance provider and regional lightning protection specialists.

Standards and guidelines

The applicable local and national standards and guidelines must be observed.

This document is based on the following sources (this list is not exhaustive):

- DIN EN 62305-3 Amendment 5 (05/2014)
- DGS Photovoltaic Systems, 5th edition
- SNR 464022:2008 (Electrosuisse), as of 06/2019
- Low-Voltage Installation Standard (NIN) 2025
- Swissolar State-of-the-Art Paper No. 22001 (06/2017)
- ESTI No. 233.0710
- Häberlin, H.: Photovoltaics – Electricity from Sunlight
- E DIN VDE 0100-712:2022-10

Design of protective measures

In principle, integrated photovoltaic systems do not affect the likelihood of a lightning strike. The installation of a Solrif system therefore does not alter either the obligation to provide lightning protection or the lightning protection class of a building.
If a lightning protection system is in place, the relevant national standards must be strictly adhered to (e.g. NIN in Switzerland). With the Solrif system, particular attention must be paid to surge protection due to the specific
system design, special attention must be paid to surge protection, irrespective of the external lightning protection.

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Integration or separation distance

For buildings with external lightning protection (air terminals, conductors, etc.), a separation distance must be maintained between the PV system and the lightning protection conductors.
The formula for calculating the separation distance *s* is calculated as follows in accordance with DIN EN 62305-3 :

$$s = \frac{k_i}{k_m} \times (k_{c1} \times l_1 + k_{c2} \times l_2 + \ldots + k_{cn} \times l_n) \; [m]$$

k_i: Depending on the selected protection class of the LPS (*Lightning Protection System*) in accordance with DIN EN 62305-3, Table 10.

k_m: Depending on the electrical insulating material used in accordance with DIN EN 62305-3, Table 12.

k_c: Depending on the proportion of lightning current flowing through the down conductors, in accordance with DIN EN 62305-3, Table 11.

l: Length of the interception system (cable length) from the point at which the separation distance *s* is to be determined to the nearest point of equipotential bonding.

If the required distance cannot be maintained, the PV system must be integrated into the lightning protection system. The design must be carried out by a qualified specialist.

Equipotential bonding

Requirements in Switzerland: The following minimum cross-sections apply to equipotential bonding:

- Module connections: ≥ 6 mm² Cu
- Main conductor to the earthing bar: ≥ 10 mm² Cu

International requirements: For other countries, the applicable national regulations must be.

Lightning protection system on a Solrif installation under direct strike

Lightning currents diverted to frame components can destroy the bypass diodes of the PV modules. This and other consequential damage can result in a loss of output. Following a lightning strike, the system must be inspected by a qualified technician.

Additional notes on guidelines

The recommendations for handling the Solrif mounting system must also be checked against the applicable country-specific guidelines. For questions regarding the planning, installation or maintenance of the lightning protection system, certified lightning protection specialists in the relevant region should be consulted.

Specific notes for Switzerland

Protective equipotential bonding may only be omitted if the system complies with the requirements of protection class II and the inverter is fitted with galvanic isolation (ESTI No. 233.0710). In Switzerland and under ESTI regulations, equipotential bonding must always be provided for transformerless inverters.

Technical Support

Contact for technical support: tech.solar@ernstschweizer.com