PLANNING GUIDE

Solar Energy and Green Roofs

ZinCo

Life on Roofs

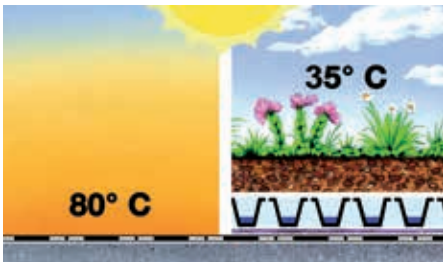
Exploiting Synergy Effects on Your Roof – with the SolarVert® System Build-up

Green roofs offer a wide range of benefits. They enhance thermal insulation, protect the waterproofing, offer a natural habitat for plants and animals, retain stormwater, improve the microclimate and create important garden and recreational areas.

The ZinCo Solar Base adds a significant new benefit: the integration of solar energy use into the green roof build-up.
The ZinCo Solar Base is incorporated into the SolarVert® System Build-up. The function of the green roof as an ecological compensation area is not affected.

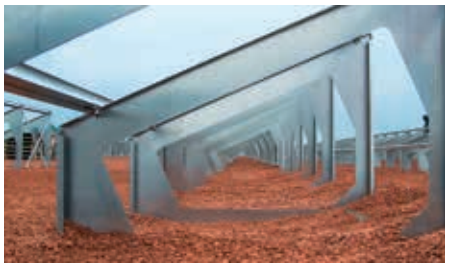
Partial view of the "InCenter" shopping mall roof in Landsberg/Lech, Germany. shortly after installation (left) and with established vegetation (right).

SolarVert® benefits at a glance:



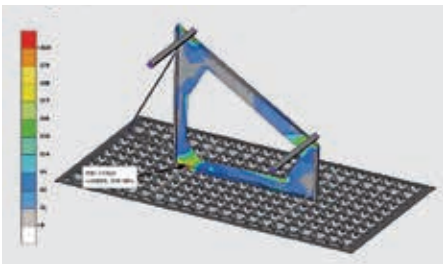
Improved performance due to the cooling effect of a green roof

Compared with roofs that have a gravel layer or a bare membrane, green roofs provide for a lower ambient temperature, resulting in measurable benefits with SolarVert® (see page 7).



Installation without roof penetration

The green roof build-up provides the necessary superimposed load to resist wind suction loads. This avoids the need for complicated roof penetrations and prevents load concentration.



Structural calculation allows for reliable planning

The structural calculation available for the solar base and the solar base frame is in line with the European Standards EN 1993-1- and EN 1999-1 (Eurocodes 3 and 9), see illustration above. This meets the requirements of DIBT (Guideline for the construction, planning and installation of solar energy systems, May 2012).

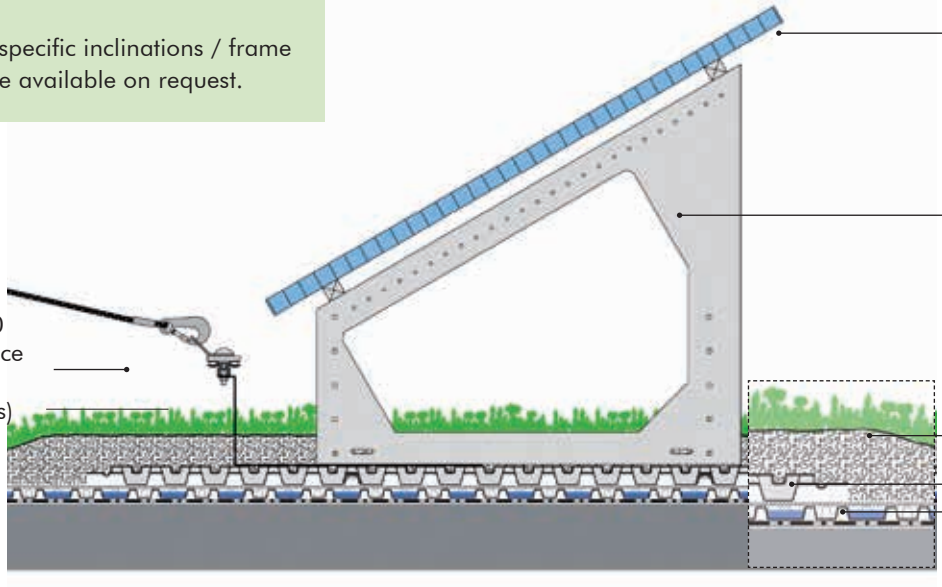
Also suitable for solar thermal installations

Unlike photovoltaic systems solar thermal collectors are usually installed with a steeper inclination on the roof. The Base Frames are available in 5° steps up to 45° as standard solution.

The solar base frame is available in different variations (inclination in increments of 5°):

SGR 5 (5 degrees) – SGR 45 (45 degrees)

Other project specific inclinations / frame dimensions are available on request.



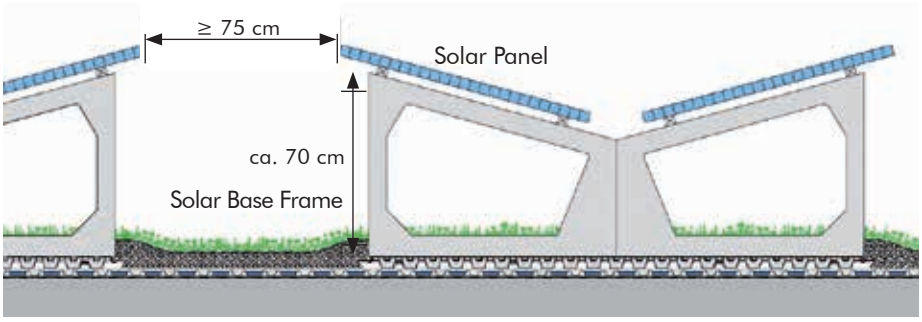
Build-up height:	from 120 mm
Weight dry:	from 94 kg/m² *
Weight saturated:	from 120 kg/m²*

*** Please note:**
The required superimposed load needs to be reached by the dry weight of the system build-up, while the load bearing capacity of the roof construction needs to support the water-saturated weight.
The dry weight of the build-up is decisive for the required superimposed load, while the water-saturated weight determines the design of the roof construction.

Project Specific Variations for East-West Orientation

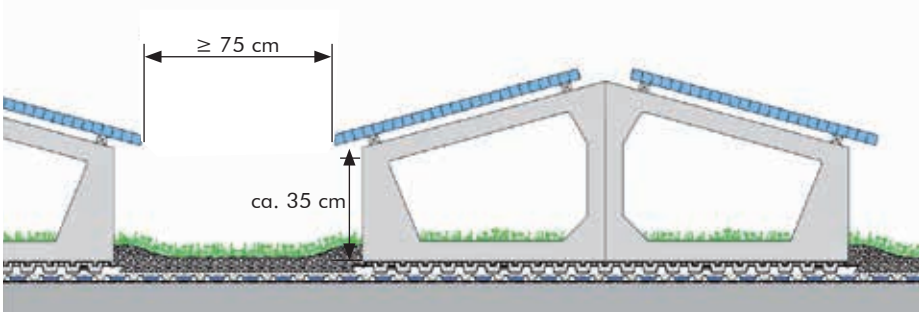
Systems with east-west orientation may achieve a more even yield over the course of the day and avoid excessive current peaks.

Solar Substructure Type "Butterfly"



For an assembly of type "Butterfly", the two Solar Base Frames meet with their lower sides. Rainwater is directed to the middle of the Solar Base SB 200 and distributed from there in both directions. In this case, a rather lush vegetation can be expected under the solar panels. The plants are relatively easy to access from the walkways between the panels because the panels have their maximum distance of approx. 70 cm to the substrate surface there.

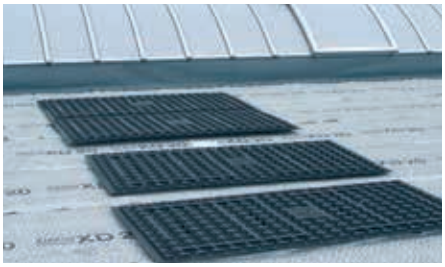
Solar Substructure Type "Saddle"



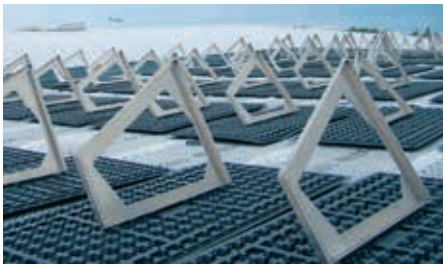
For an assembly of type "Saddle", two Solar Base Frames are mounted onto a Solar Base SB 200 in a way that their higher ends meet in the middle. The front edge of the solar panels has a sufficient distance to the substrate surface so that plants can still grow under the panels. The slope of the panels directs more rainwater to the walkways between the solar panel rows, so that an increased plant growth can be expected there.

And this is how it works:

1. *The roof membrane is covered with the protection, drainage and water retention element Fixodrain® XD 20.*



2. *The Solar Bases SB 200 are laid over the Fixodrain® XD 20.*



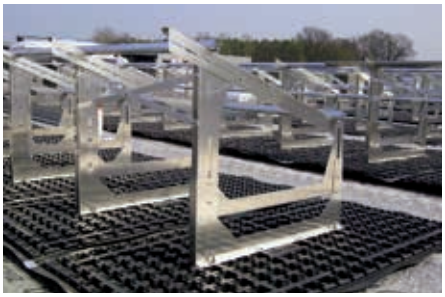
3. *The Solar Base Frames SGR are placed and adjusted on the ZinCo Solar Bases.*

4. *The Solar Bases are covered with system substrate as per the required load.*

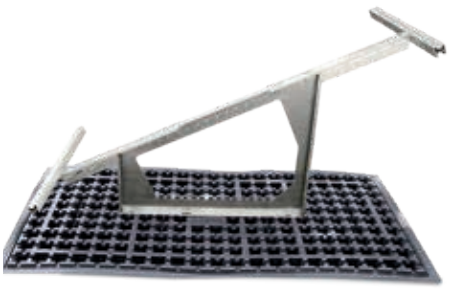
5. *The solar panels are installed.*

6. *Roof with fully-installed solar energy system.*

A broad range of accessories



Vertically adjustable Solar Base Frames and Adapter Profiles for levelling out roof pitch and installation of large modules.



Solar Base Frame with Adapter Profiles to increase the mounting distance

Frame 45° for solar thermal panels on a roof area with a 5° slope.

Two pre-punched flat aluminium profiles for crosswise stabilization of two Solar Base Frames.

Please note:
Consider the external and internal lightning arrester which may be necessary with solar energy systems (both photovoltaic and solar thermal energy installations) on top of a building. This should be clarified for each individual building e.g. with your electrical engineer.

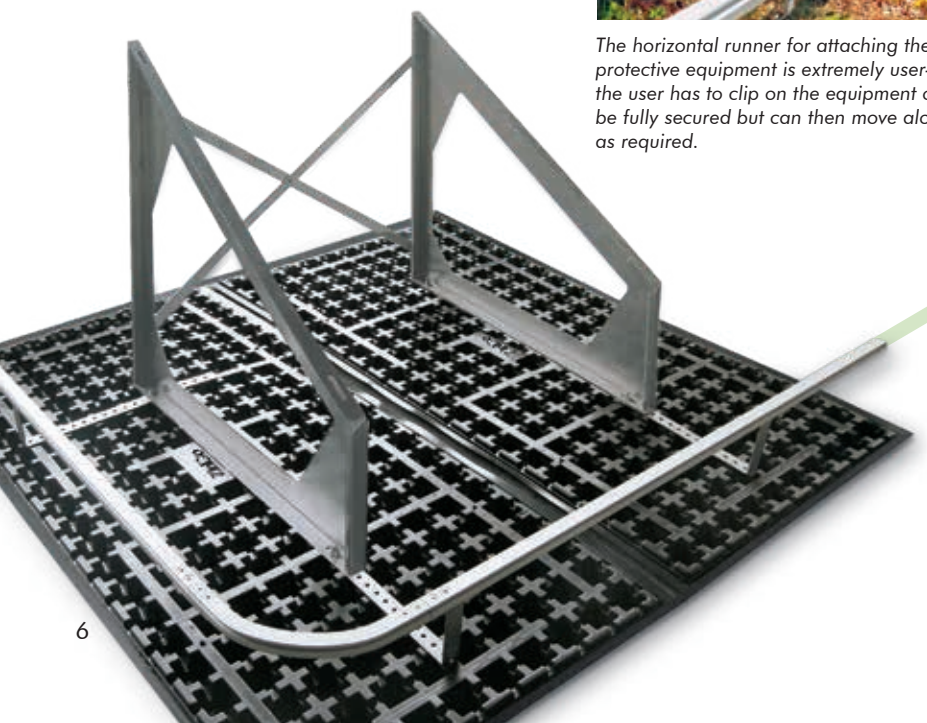
Your Safety is Our Priority: Fall Protection Fallnet® SB 200 Rail

Fall protection systems are required to prevent people from falling off flat roofs while working. Such work includes maintenance of solar energy systems. Single fixing points are usually not very useful as the solar panels often reach close to the roof edge.

The ZinCo Fallnet® SB 200 Rail fixing device offers a solution for this situation. It was designed especially for the use in combination with ZinCo Solar Base SB 200. The periphery of the existing photovoltaic system is also used for the fixing device. All you need in addition is a rail, rail supports and project related accessories. This allows for a quick and inexpensive installation of an effective fall arrest system that integrates well into the landscape.

The horizontal runner for attaching the personal protective equipment is extremely user-friendly as the user has to clip on the equipment only once to be fully secured but can then move along the rail as required.

Non-penetrating installation as the required load is provided by Zincolit® or system substrate or an alternative bulk material.



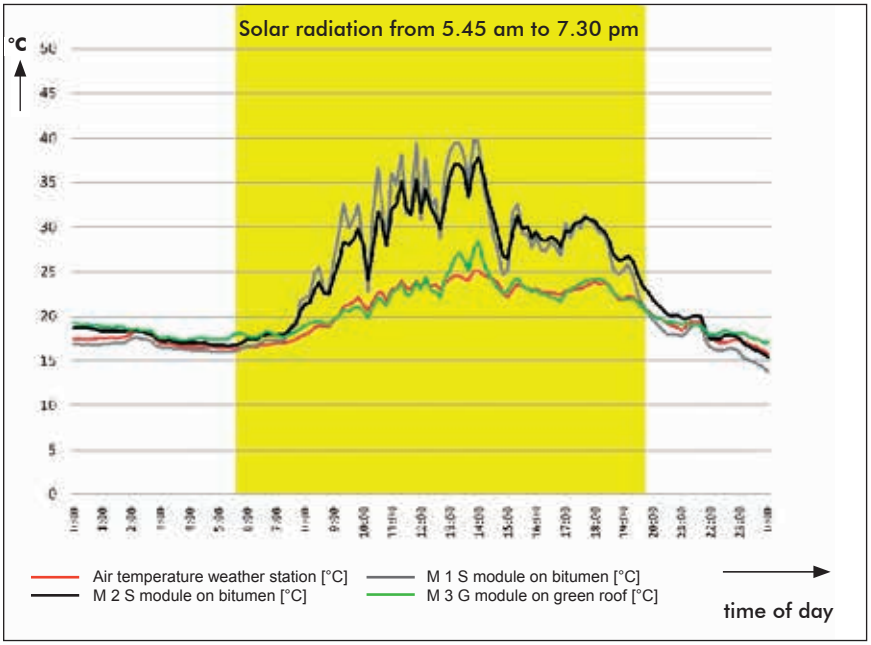
In order to fully exploit the available roof area, solar energy systems are generally installed right up to the roof edge. With the Fallnet® SB 200 Rail, you can work absolutely safely along roof edges.

The Figures Prove It: Green Roofs Improve the Efficiency of PV Modules Permanently

The efficiency of photovoltaic modules depends on their temperature. Generally, as a rule of thumb we say that "the higher the temperature, the lower the level of efficiency".

The temperature of Standard Test Conditions, by which these modules were examined , is 25 °C. In practice, the temperature of the modules increases considerably due to solar radiation. This is compounded by the hot surface of the roof, for example dark waterproofing or a gravel roof, which can easily lead to temperatures of up to 90 °C. A green roof, on the other hand, will retain a moderate temperature even on hot days, with the surface temperature rarely rising above 30 to 35 °C.

The temperature-related change in the performance of a module is demonstrated by the temperature co-efficient. It depends on the product and is up to 0.5 % per Kelvin (K) with standard solar panels.



Graph: example of temperature graph recorded on a day in July. The temperature of the modules over a bituminous membrane (black and grey lines) rises to almost 40 °C, while that of the module on the green roof (green line) does not go beyond a maximum of 27 °C and is, therefore, close to the ambient temperature (red line).

Extract from the measurement log.

The difference in temperature of various roof build-ups was measured using a test installation on a ZinCo roof.

The test involved two modules installed on a "naked" membrane panels being compared with one module installed on a green roof. In each case, attention was focused on the temperature at the underside of the panels.

Throughout the entire year, average daily temperature differences of about 8 K were measured.

Enduring and Technically Sound Solutions.

This planning guide aims to provide you with a general overview of how solar energy technology is combined with green roofs.

Our engineers will be glad to help you work out the details for your own particular project; from the planning stage right through to creating the required specification texts.

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