Planning Guide

Solar energy and green roofs

Engineered Green Roof Systems

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 storm water, 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 function of a green roof as an ecological compensation area is, therefore, fully maintained with Solar Base®, which is incorporated into the SolarVert® system build-up.

Photovoltaic plant on the roof of the “InCenter” shopping mall in Landsberg/Lech, Germany.

Some of the benefits of SolarVert®

Improved performance due to the cooling effect of a green roof

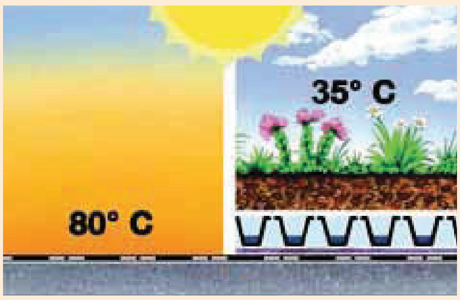
Compared with roofs that have a gravel layer or a bare membrane, green roofs provide for a lower ambient temperature, resulting in benefits with SolarVert® that can be measured (see page 7).

Not too light and not too heavy, providing load and also wind suction prevention

The green roof build-up provides the load necessary for preventing wind suction with the solar energy system. This avoids the need for complicated roof penetrations and prevents load concentration.

Solar thermal systems can also be used

Solar thermal modules are generally installed at a greater slope on the roof compared with photovoltaic units. The base frames required are manufactured according to the requirements of the building.

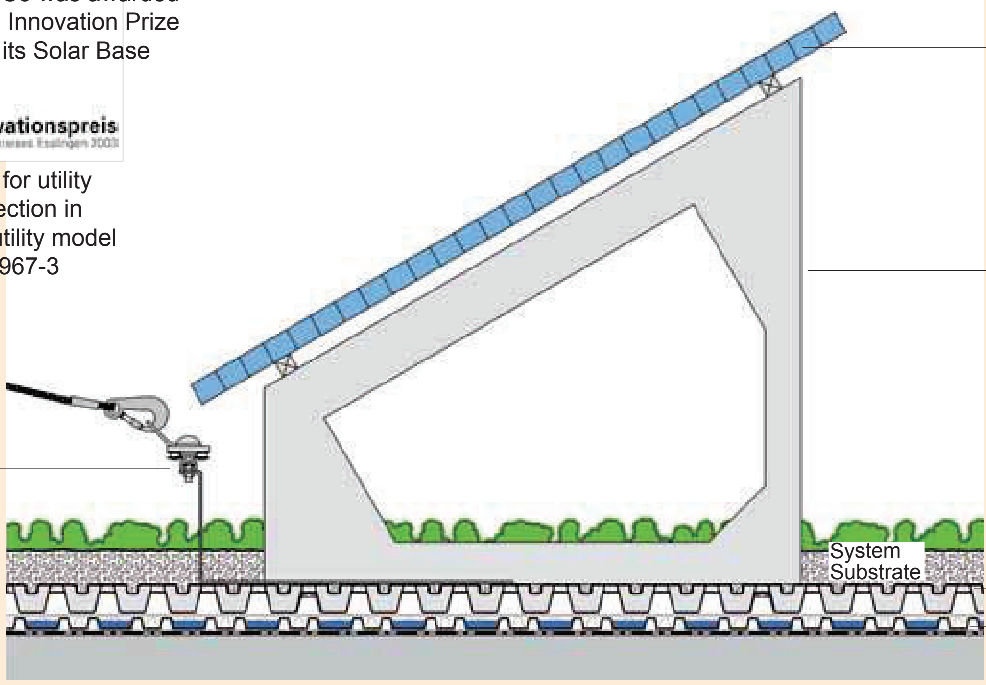


Roof of Pro Natur premises in Metzingen, Germany

ZinCo was awarded the Innovation Prize for its Solar Base

Innovationspreis

Registered for utility model protection in Germany, utility model no. 203 11 967-3



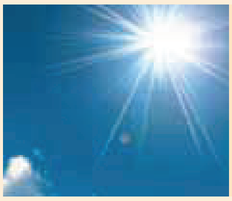
Build-up height:	**from 120 mm**
Weight dry:	**94 kg/m²**
Weight saturated:	**120 kg/m²**

Some basic information about solar heat gain on

What does the level of energy generated depend upon?

Location

The more sunshine, the better. The daily level of solar radiation on the panels results from the location in terms of latitude.



Available solar radiation / global radiation

Annual global radiation in kWh/m² can be read using climate maps.

Orientation (direction / Azimuth angle)

The Azimuth angle defines the level of deviation from the southerly orientation. The smaller it is, the higher the efficiency of the solar panels.

Inclination, orientation

Defines the deviation of the solar panel from the horizontal. For example, in southern Germany the ideal angle is 30°.

Shading elements such as chimneys, ventilators, light domes, technical constructions etc.

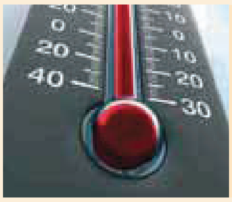
Shading inevitably reduces the performance of a solar panel. Potential shadow-casting elements must be taken into consideration when choosing location.

High neighbouring buildings or trees

In certain circumstances, performance may be considerably affected by these.

Shading interval between module rows

The module rows should be positioned such that they do not throw a shadow onto each other.



Temperature of solar modules

The ambient temperature of the modules is a decisive factor in their performance. For further details see page 7.

And this is how it works:

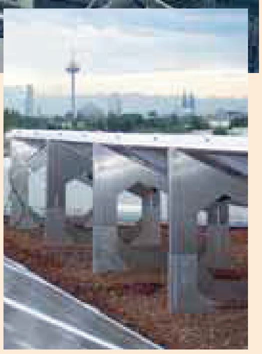
The roof membrane is covered with a Fixodrain® XD 20 high-grade drainage and protective layer.

Then, the Solar Base® plates SB 200 are laid.

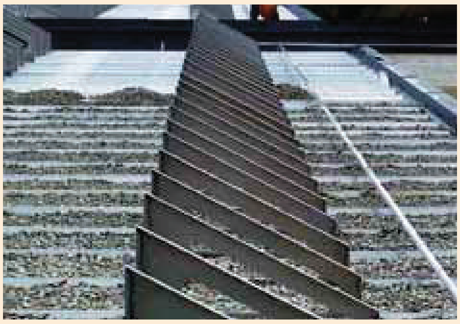
The Solar SGR 35/90 are placed on the ZinCo Solar Base® plates and adjusted.

Photovoltaic system on a school building in Neckargmünd, Germany

A broad range of accessories and solutions tailored to specification



Height-adjustable Solar Base frame for levelling out the roof pitch (e.g. with thermal insulation incline).



Linking the system with aluminium profiles, for example in a wind zone 2 location, with the adjunct “coast” and unfavourable structural conditions.

Base frames with a different angle are often used for solar thermal systems.

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

The Solar Base® plates are covered with system substrate as per the required load.

The solar panels are installed.

Roof with fully-installed solar energy system.

Your safety is our priority: Fall protection

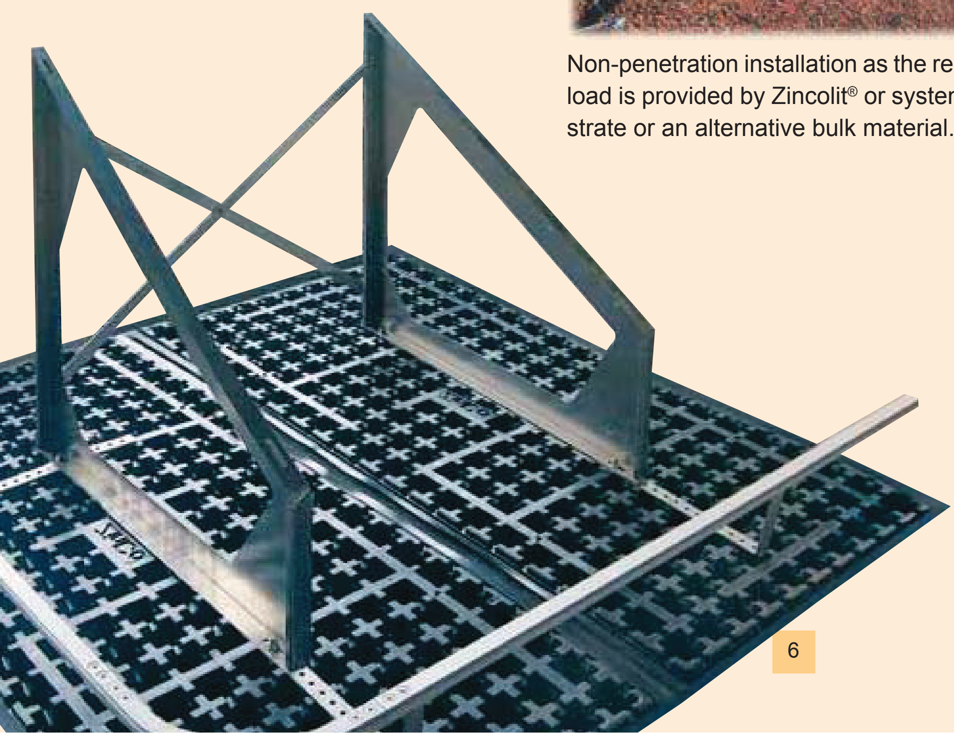
Fallnet® SB 200 Rail

Fall protection systems are required to prevent people falling off flat roofs while working at a height of 3 m and above. Such work includes maintenance work on 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 has been designed especially for 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 support 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 secure but can then move it along the rail as required.

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

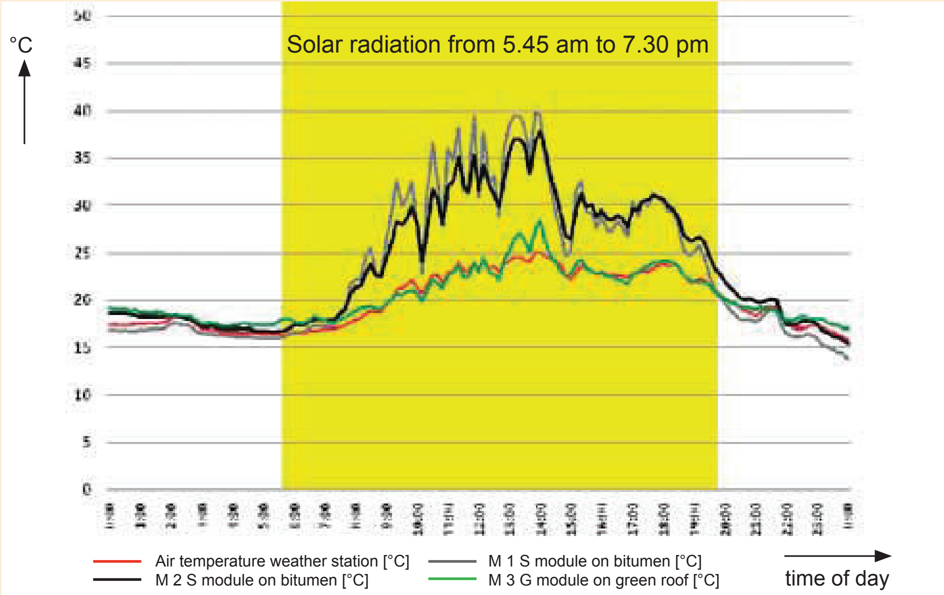
In order to fully exploit the available roof area, solar energy systems are generally installed right up to the roof edge. With the Fallnet® SB 200 Rail, you can work absolutely safely around roof edges.



The figures prove it: Green roofs improve the efficiency of PV modules permanently

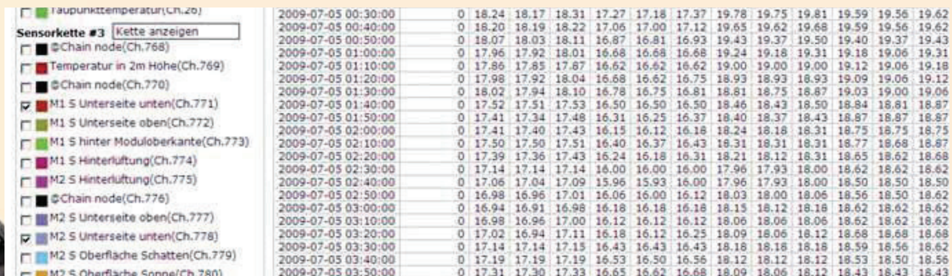
The efficiency of photovoltaic modules depends on their temperature. Generally, as a rule of thumb we say that “the greater the temperature, the lower the level of efficiency”. The temperature of these modules, which were measured in Standard Test Conditions, is 25°C. In practice, the temperature of 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. This depends on the product and is up to 0.5 % per Kelvin (°K) with standard solar panels.



Graph: example of temperature graph recorded on 6 July 2009. The temperature of the modules on the bituminous panels (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).

The difference in temperature of various roof build-ups was measured throughout the year 2009 using a test installation on a ZinCo roof. The test involved two modules installed on “naked” bituminous 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.



Sensorkette #3 Kette anzeigen
©Chain node(Ch.768)
Temperatur in 2m Hohe(Ch.769)
©Chain node(Ch.770)
M1 S Unterseite unten(Ch.771)
M1 S Unterseite oben(Ch.772)
M1 S hinter Moduloberkante(Ch.773)
M1 S Hinterluftung(Ch.774)
M2 S Hinterluftung(Ch.775)
©Chain node(Ch.776)
M2 S Unterseite oben(Ch.777)
M2 S Unterseite unten(Ch.778)
M2 S Oberflache Schatten(Ch.779)
M2 S Oberflache Sonne(Ch.780)

2009-07-05 00:30:00		0	18.24	18.17	18.31	17.27	17.18	17.37	19.78	19.75	19.81	19.59	19.56	19.62
2009-07-05 00:40:00		0	18.20	18.19	18.22	17.06	17.00	17.12	19.65	19.62	19.68	19.59	19.56	19.62
2009-07-05 00:50:00		0	18.07	18.03	18.11	16.87	16.81	16.93	19.43	19.37	19.50	19.40	19.37	19.43
2009-07-05 01:00:00		0	17.96	17.92	18.01	16.68	16.68	16.68	19.24	19.18	19.31	19.18	19.06	19.31
2009-07-05 01:10:00		0	17.86	17.85	17.87	16.62	16.62	16.62	19.00	19.00	19.00	19.12	19.06	19.18
2009-07-05 01:20:00		0	17.98	17.92	18.04	16.68	16.62	16.75	18.93	18.93	18.93	19.09	19.06	19.12
2009-07-05 01:30:00		0	18.02	17.94	18.10	16.78	16.75	16.81	18.81	18.75	18.87	19.03	19.00	19.06
2009-07-05 01:40:00		0	17.52	17.51	17.53	16.50	16.50	16.50	18.46	18.43	18.50	18.84	18.81	18.87
2009-07-05 01:50:00		0	17.41	17.34	17.48	16.31	16.25	16.37	18.40	18.37	18.43	18.87	18.87	18.87
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2009-07-05 02:10:00		0	17.50	17.50	17.51	16.40	16.37	16.43	18.31	18.31	18.31	18.77	18.68	18.87
2009-07-05 02:20:00		0	17.39	17.36	17.43	16.24	16.18	16.31	18.21	18.12	18.31	18.65	18.62	18.68
2009-07-05 02:30:00		0	17.14	17.14	17.14	16.00	16.00	16.00	17.96	17.93	18.00	18.62	18.62	18.62
2009-07-05 02:40:00		0	17.06	17.04	17.09	15.96	15.93	16.00	17.96	17.93	18.00	18.50	18.50	18.50
2009-07-05 02:50:00		0	16.98	16.96	17.01	16.06	16.00	16.12	18.03	18.00	18.06	18.56	18.50	18.62
2009-07-05 03:00:00		0	16.94	16.91	16.98	16.18	16.18	16.18	18.15	18.12	18.18	18.62	18.62	18.62
2009-07-05 03:10:00		0	16.98	16.96	17.00	16.12	16.12	16.12	18.06	18.06	18.06	18.62	18.62	18.62
2009-07-05 03:20:00		0	17.02	16.94	17.11	16.18	16.12	16.25	18.09	18.06	18.12	18.68	18.68	18.68
2009-07-05 03:30:00		0	17.14	17.14	17.15	16.43	16.43	16.43	18.18	18.18	18.18	18.59	18.56	18.62
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2009-07-05 03:50:00		0	17.31	17.30	17.33	16.65	16.62	16.68	18.09	18.06	18.12	18.43	18.43	18.43

Extract from the measurement log.

Enduring and technically impeccable solutions.

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

Our

ZinCo Technical Department

as well as our

technical consultants

will assist you with help and advice: from the planning stage through to the writing of the

specification documentation.
Challenge us!

Technical statements are subject to alterations and printing errors.

08/10

ZinCo GmbH
Lise-Meitner-Str. 2 • 72622 Nürtingen • Germany
Tel. +49 7022 6003-0 • Fax +49 7022 6003-100
E-Mail: info@zinco-greenroof.com