

Solar systems by Schweizer:

Information sheet – MSP-FR photovoltaic mounting system on gravel roofs

About gravel roofs

A gravel roof is a flat roof that is covered with gravel. "Gravel roof" is thus a colloquial term that does not designate the actual sealing method of the roof.

The gravel layer is usually at least 5 cm thick. It serves to protect the waterproofing membrane against UV radiation and heat, thus slowing down its ageing. It can also serve as a weighting for the waterproofing membrane, which would otherwise need additional fastenings in order not to be lifted off by the suction effect of wind.

Furthermore, a layer of gravel can serve the purpose of fire protection, preventing fire flashover from adjacent superstructures. With a layer of at least 5 cm of gravel, a flat roof is considered to be 'hard roofing' according to DIN 4102 regardless of the material of the waterproofing, and thus sufficiently resistant to flying sparks and radiant heat.

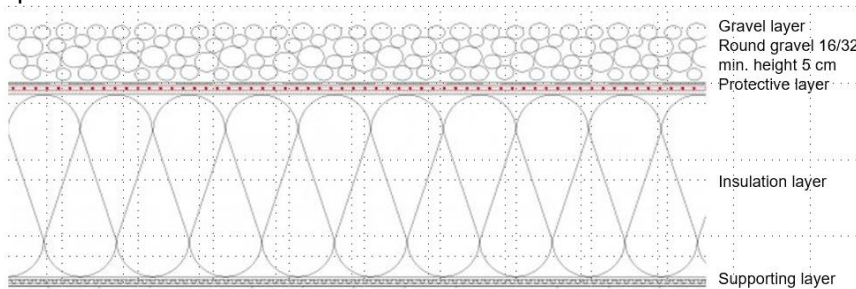


Figure 1: typical structure of a gravel roof

Situation and queries

The MSP-FR photovoltaic mounting system from Schweizer is optimised for uncovered concrete, bitumen, EPDM and foil roofs with a flat surface. Hence the question arises how mounting can be carried out on gravel roofs. Basically there are three options to choose from, as shown in Figure 2 (variants a), b) and c).)

Variant a): The base plates are laid on the gravel layer.

Variant b): For each base plate, a local, fixed intermediate layer is embedded in the gravel layer. The base plate is laid on top of this. Suitable materials are e.g. XPS panels, PUR/PIR rigid foam panels, bricks or concrete slabs.

Variant c): The gravel is removed where necessary, and the base plate is laid on the roof sealing.

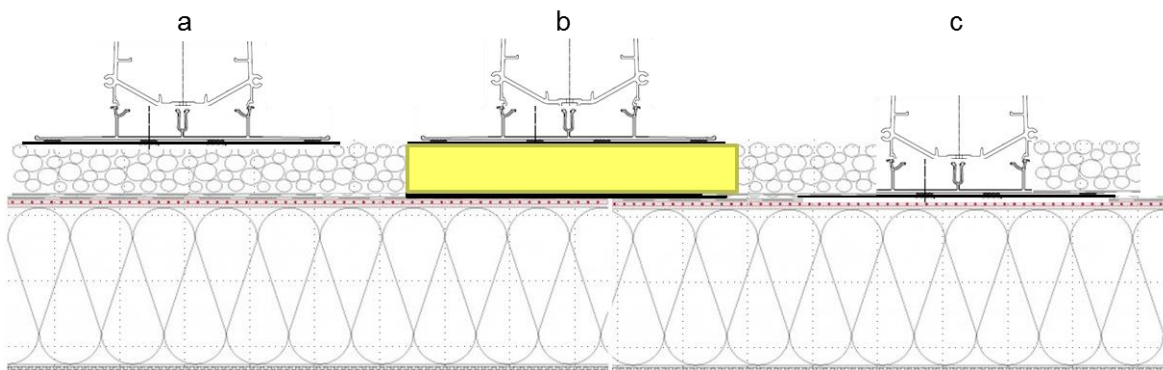


Figure 2: MSP-FR options for gravel roofs

It is important that the friction coefficient relevant for the static displacement measurements be observed in all cases. With variant a) this can be critical, because round gravel does not present a determinate surface.

Discussion of the variants

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Variant	Advantages	Important points
Variant a	<ul style="list-style-type: none"> – Little outlay involved – No interaction with the substrate 	<ul style="list-style-type: none"> – Coefficient of friction difficult to determine, must be chosen low in the planning (see recommendation below). – There is a risk of punctual pressure points damaging the roofing film. – With older surfaces that are uneven due to wind loads, the system may not be in contact with the roofing membrane everywhere and tensions may occur.
Variant b	<ul style="list-style-type: none"> - Well defined situation - No interaction with the substrate - Suitable for any depth 	<ul style="list-style-type: none"> - A long-term resistant material with well defined surface friction coefficients must be selected as a base (see recommendation below). - No direct contact of the material with the roofing foil (underlay with additional fleece). - When placing the underlay in an existing gravel covering, there is a risk of damaging the roof sealing.
Variant c	<ul style="list-style-type: none"> - Well defined situation - No additional material required 	<ul style="list-style-type: none"> - Only suitable for minimal gravel layers (5 cm). - Interaction with the substrate can lead to corrosion depending on the pH value. - If drainage is hindered, the base plate and supports will be immersed in water for extended periods.

Table 1: Discussion of the variants

Recommendations

Variant	Structure	Additional recommendations
Variant a	Gravel fleece – base plate	<ul style="list-style-type: none"> - Measurement in proMSP with coefficient of friction 0.25 (tbd)
Variant b	Roof foil – XPS plate – base plate	<ul style="list-style-type: none"> - Maximum height of the XPS plate as depth of gravel, dimensions like base plate. - As coefficient of friction the XPS value is chosen (tbd) - Check compatibility of the intermediate layer with the roofing film
Variant c	Roof foil fleece base plate	<ul style="list-style-type: none"> - Fairly frequent checks for gravel displacement and corrosion phenomena (recommended: once a year) - The material value of the roof foil is selected as the coefficient of friction.

Table 2: Recommendations

Selection and reference of sourcing for XPS intermediate layers

- Germany: BACHL XPS® 300; Karl Bachl Kunststoffverarbeitung GmbH & Co.
- Austria: Austrotherm XPS® TOP P; Austrotherm Dämmstoffe GmbH
- Switzerland: swissporXPS (XPS); swisspor AG

Sequence of installation of MSP-FR with an intermediate layer on gravel roof

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Figure 3: Clear local area of gravel completely



Figure 4: Insertion of the intermediate layer of XPS, underlaid with a protective layer of fleece (if necessary)



Figure 5: Placement of the base plate with support, fleece under the base plate



Figure 6: Shallow covering of the intermediate layer with gravel



Figure 7: Support with mounted connecting rail



Figure 8: MSP-FR mounting system completely installed