

Solar Systems from Schweizer

Leaflet PV Mounting System MSP-PR

On-site Fasteners and Components in the Solar.Pro.Tool (SPT)



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1 MSP-PR PV mounting system

The MSP-PR PV mounting system is designed for use on pitched roofs. An aluminium roof hook system with sophisticated click fastening is supplemented by classic stainless steel roof hooks and hanger bolts which secure anchoring of the supporting structure in the roof. The support profiles are fastened with the prefabricated clamps in a single layer or through cross-connection.

Combination of MSP-PR with on-site fasteners



The MSP-PR-HBP adapter plate is available for combining on-site fasteners with the MSP mounting system (item no: 2065896).

Depending on the on-site fastener, additional fasteners (e.g. screws, nuts) should also be provided on site.

Figure 1: MSP-PR-HBP adapter plate

Information on strength values of on-site fasteners

- Characteristic values are usually specified in approvals, and these are converted to design values using a partial safety factor γ_M .
- Design values must be requested from the supplier if no approvals are available.
- Data relating to pressure at an angle must be converted into pressure and shear force components.
- The following catalogue provides tables with load-bearing capacity values and instructions for handling the values.
- All information is beyond the realm of responsibility of Ernst Schweizer AG and is not guaranteed with regard to correctness, up-to-dateness or compatibility with MSP components. In the event of uncertainties, please contact the supplier of the fastening elements.

Interaction with simultaneously acting load directions

1. The standard calculation in SPT is without interaction (i.e. pressure and shear force may be fully utilised at the same time).
2. With some fasteners, the "linear interaction" between compression and shear force is applied, meaning (utilisation of pressure) + (utilisation of shear force) \leq 100%.
3. Another variant is the square interaction: (utilisation pressure) ² + (utilisation of shear force) ² \leq 100%.

Note: If interaction is required, please contact the in-house service department (msp@ernstschweizer.com) for the design.

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On-site Fasteners and Components in the Solar.Pro.Tool (SPT)

2 Planning in the Solar.Pro.Tool (SPT)

1. Selection of roof covering and substructure according to local conditions.
2. Selection of fastening system: "Roof hook/fastening element on site - without interaction".*
3. Connection components: "MSP-PR-HBP adapter plate" or "Without connection".
4. Laying system: All options are available. The planner must assess what is technically feasible.
5. Enter the design values for pressure, tension and shear force according to the supplier's specifications or table values. The values listed below are taken from data sheets or approvals of the respective manufacturers and are not guaranteed in terms of correctness or applicability.

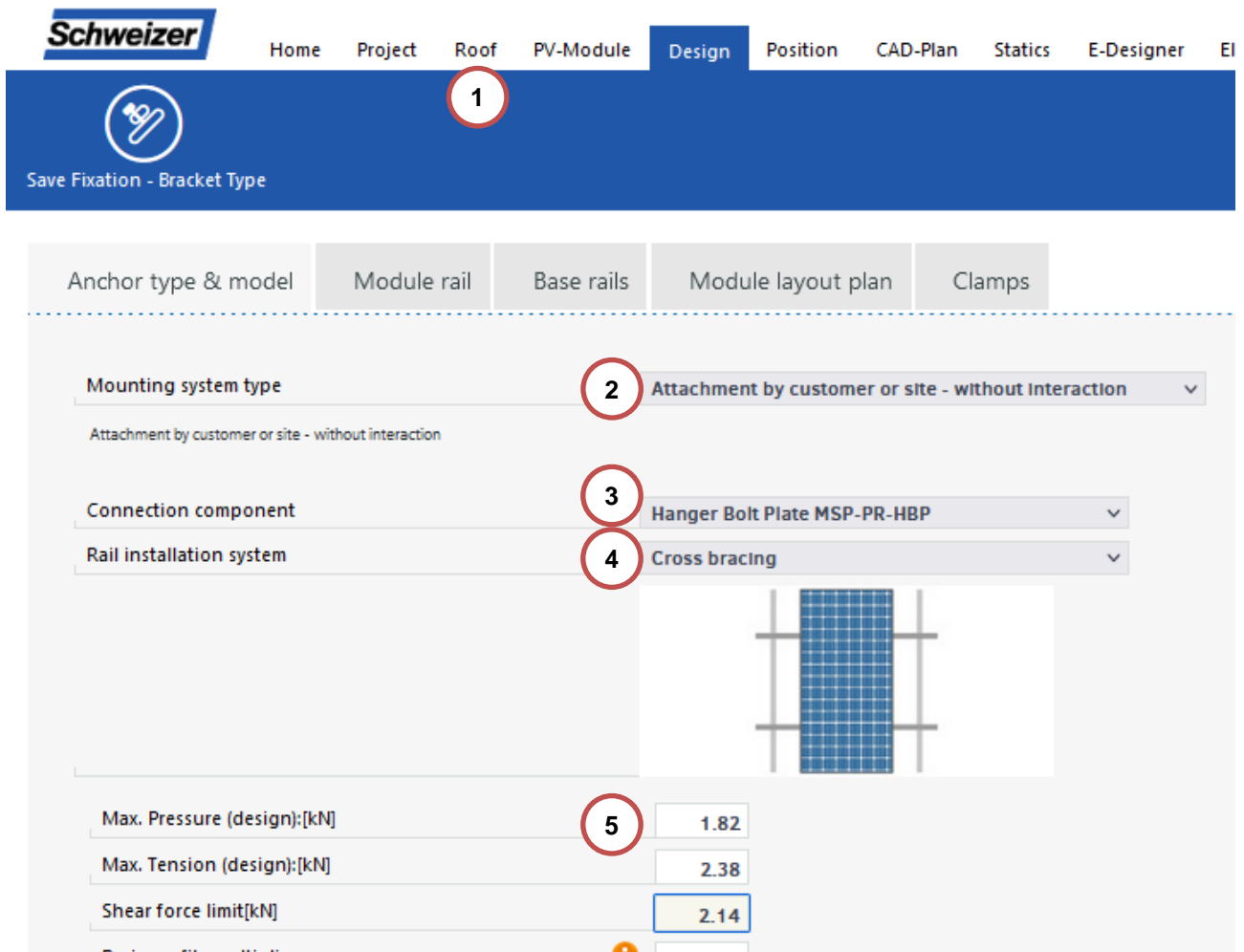


Figure 2: Selection of parameters for on-site fasteners

* "Without interaction": Limit values must be entered for the load-bearing capacity pressure and shear force, which may be applied in full simultaneously.

3 Products

3.1 Manufacturer/Supplier: Otto Lehmann GmbH, D-93070 Neutraubling

Product designation: Lehmann roof module bracket 7300 riveted to metal roof panels

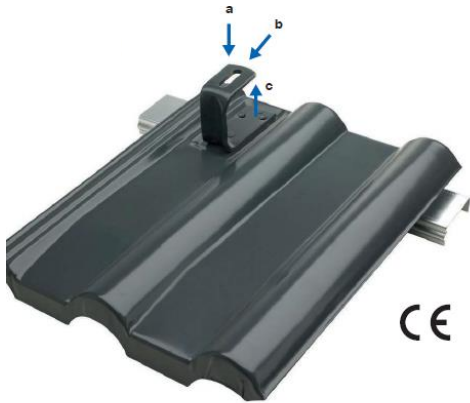


Figure 3: Lehmann roof module bracket

Application in SPT: Select the design values from Table 1 to suit the roof pitch.
Interaction condition: "Without interaction".

Table 1: Design values of the load-bearing capacity

Force angle	Pressure	Suction	Shear force
0°	3.61 kN	2.16 kN	0.00 kN
5°	3.35 kN	2.16 kN	0.29 kN
10°	2.97 kN	2.16 kN	0.52 kN
15°	2.59 kN	2.16 kN	0.70 kN
20°	2.26 kN	2.16 kN	0.82 kN
25°	1.97 kN	2.16 kN	0.92 kN
30°	1.72 kN	2.16 kN	1.00 kN
35°	1.51 kN	2.16 kN	1.05 kN
40°	1.31 kN	2.16 kN	1.10 kN
45°	1.14 kN	2.16 kN	1.14 kN
50°	0.98 kN	2.16 kN	1.17 kN
55°	0.84 kN	2.16 kN	1.20 kN
60°	0.71 kN	2.16 kN	1.22 kN
65°	0.58 kN	2.16 kN	1.24 kN
70°	0.46 kN	2.16 kN	1.26 kN
75°	0.34 kN	2.16 kN	1.27 kN

3.2 Manufacturer/Supplier: Jacobi Walther GmbH, D-37434 Bilshausen

Product designation: Aluminium solar support with base tile, available with various roof tiles.



Figure 4: Jacobi Walther flat roof tile J11v with aluminium solar support

Application in SPT: Select the design values from Table 2 to suit the roof tile.
Interaction condition: "Without interaction". This does not constitute a binding structural verification. The responsibility lies with the contractor.

Table 2: Design values of the load-bearing capacity

	Pressure	Suction	Shear force
Flat roof tile J11v	6.1 kN	3.9 kN	6.3 kN
Flat roof tile J13v	4.4 kN	3.8 kN	5.7 kN
Flat roof tile J160	6.73 kN	3.81 kN	5.75 kN
Flat roof tile W6v	5.9 kN	5.0 kN	5.5 kN
Flat roof tile Z5	7.3 kN	4.8 kN	3.9 kN
Standard interlocking tile Z10	4.9 kN	2.8 kN	3.9 kN

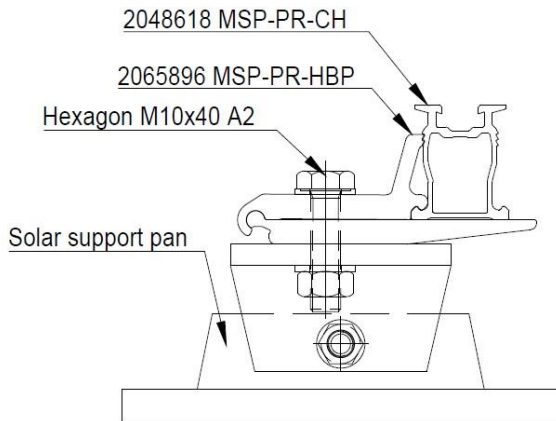
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On-site Fasteners and Components in the Solar.Pro.Tool (SPT)

Proposal for fastening adapter plate to solar support pan

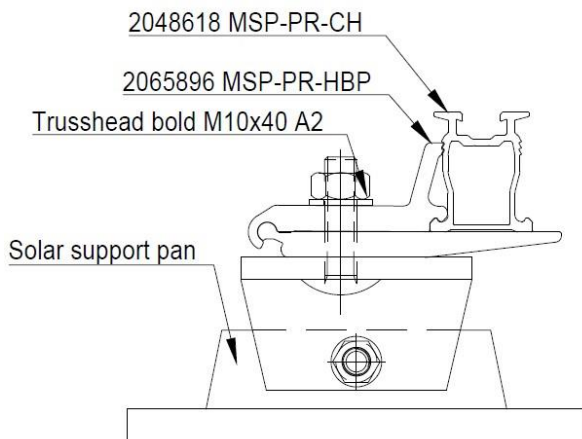
- Variant 1 with M10



Structure consisting of

- Solar support pan from Jacobi Walther
- 2065896 MSP-PR-HBP adapter plate
- 2048618 MSP-PR-CH carrier profile
- Screw DIN933 ISO4017 stainless steel A2 M10x40
- Washer DIN125A ISO7089 stainless steel A2 M10
- Hexagon nut DIN934 ISO4032 stainless steel A2 M10

- Variant 2 with M10



Structure consisting of

- Solar support pan from Jacobi Walther
- 2065896 MSP-PR-HBP adapter plate
- 2048618 MSP-PR-CH carrier profile
- Screw DIN603 UNI5732 stainless steel A2 M10x40
- Washer DIN125A ISO7089 stainless steel A2 M10
- Hexagon nut DIN6923 EN1661 stainless steel A2 M10

3.3 Manufacturer/Supplier: Zambelli RIB-ROOF GmbH & Co. KG, Hans-Sachs-Strasse 3 + 5, D-94569 Stephansposching

Product designation: Standard solar holder RIB-ROOF

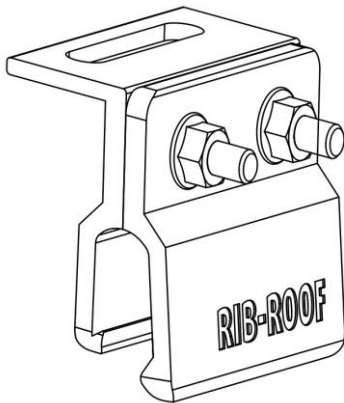


Figure 5: Standard solar holder RIB-ROOF

Application in SPT: Determine the design values by dividing the characteristic values for pressure, suction and force parallel to the roof (shear force) by the partial safety factor $\gamma_M = 1.33$. The approval Z-14.4-774 contains various characteristic values for different RIB-ROOF systems and numerous specifications, boundary conditions and interaction formulae. Following rough planning, compliance must be checked and, if necessary, recalculated with new values.
Interaction condition: "Without interaction".

Table 3: Design values of the load-bearing capacity when all boundary conditions are met

	Pressure	Suction	Shear force
RIB-ROOF 465 steel 0.63 mm	2.68 kN	1.47 kN	1.18 kN
RIB-ROOF 465 aluminium 0.70 mm	1.86 kN	1.17 kN	1.12 kN
RIB-ROOF Speed 500 steel 0.63 mm	2.50 kN	1.33 kN	1.18 kN
RIB-ROOF Speed 500 aluminium 0.70 mm	1.41 kN	0.89 kN	1.67 kN
RIB-ROOF Evolution steel 0.63 mm	2.93 kN	3.32 kN	0.80 kN
RIB-ROOF Evolution aluminium 0.70 mm	1.56 kN	2.11 kN	0.80 kN

3.4 Manufacturer/Supplier: RoofTech GmbH, Merklinger Strasse 30, D-71263 Weil der Stadt

Product designation: S-5! E-clamp

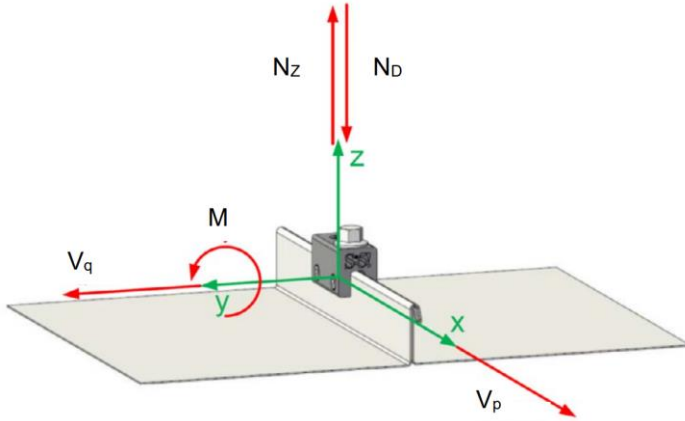


Figure 6: S-5! E-clamp

Application in SPT: Determine the design values by dividing the characteristic values for pressure, suction and force parallel to the roof (shear force) by the partial safety factor $\gamma_M = 1.33$. The approval Z-14.4-719 contains different characteristic values for different terminals and numerous specifications, boundary conditions and interaction formulae. Following rough planning, compliance must be checked and, if necessary, recalculated with new values. In addition, the standing seam profile must be verified in accordance with the relevant approvals. Interaction condition: "Without interaction".

Table 4: Design values of the load-bearing capacity under optimum conditions

	Pressure	Suction	Shear force
S-5-E, S-5-E Mini and S-5-E Mini FL	1.17 kN	1.42 kN	0.95 kN
S-5-Z, S-5-Z Mini and S-5-Z Mini FL	1.02 kN	0.86 kN	1.28 kN

3.5 Manufacturer/Supplier: Kalzip GmbH, August-Horch-Strasse 20–22, D-56070 Koblenz

Product designation: Kalzip fixing clamp type FA and type FS

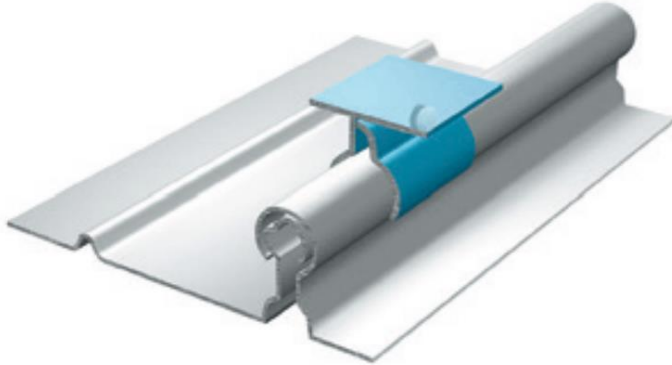


Figure 7: Kalzip fixing clamp type FA

Application in SPT: Determine the design values by dividing the characteristic value of the load-bearing capacity by the partial safety factor $\gamma_M = 1.1$. The same value applies in all directions (pressure, suction, shear force). A linear interaction verification is required between simultaneously acting forces.

The approval Z-14.4-560 contains further characteristic values for various clamps and numerous specifications, boundary conditions and interaction formulae.

Table 4 shows the load-bearing capacity relative to the sheet thickness t and clip spacing (fixing points of the sheet webs). This value for the load-bearing capacity can then be used to calculate the input values as a function of the force angle α . The interaction condition "Without interaction" applies to the calculated input values.

Table 5: Design values R_d of the load-bearing capacity according to the Kalzip data sheet

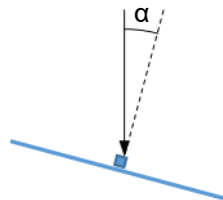
Sheet thickness t [mm]	Clip spacing L_k [m]										
	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80	1.90	2.00
0.80	1.12	1.06	1.02	0.96	0.92	0.86	0.81	0.76	0.71	0.66	0.61
0.90	1.25	1.21	1.16	1.11	1.06	1.02	0.97	0.92	0.87	0.83	0.78
1.00	1.40	1.35	1.29	1.24	1.18	1.13	1.07	1.03	0.97	0.92	0.86
1.20	1.67	1.61	1.55	1.48	1.42	1.35	1.29	1.23	1.16	1.10	1.02

Design values (input values SPT)

Pressure = $R_d \cdot \cos(\alpha)$

Suction = R_d

Shear force = $R_d \cdot \sin(\alpha)$



3.6 Manufacturer/Supplier: PREFA Aluminiumprodukte GmbH, Werkstrasse 1, A-3182 Marktl/Lilienfeld

Product designation: PREFA, Solar holder Prefalz Vario



Figure 8: PREFA, Solar holder Prefalz Vario

Important to know: Linear proof of interaction is required between simultaneously acting forces. A distinction is made between the permissible load depending on the rebate spacing and load direction. The specified values only apply to Prefalz roofs fitted using Prefa fasteners. The formwork must have a minimum $T \geq 24$ mm, C24, and the fasteners must be fixed with PREFA Niro 28-30 or 28/25 stainless steel grooved nails. The value for "Roof normal" acts normally on the roof and "Roof parallel" in the direction of the eaves or ridge.

The distance between the start of the load-bearing timber material (upper edge of the formwork) to the load application point (lower edge of the solar panel) of the horizontal force is a maximum of 150 mm.

Note: If the distribution of the fixed and sliding fasteners is not known, the values marked in **yellow** must be applied when inputting in SPT.

Table 6: Design values of the load-bearing capacity under optimum conditions

	Pressure	Suction	Shear force
Prefa fixed adhesion area, distance between two seam clamps on the same seam ≥ 600 mm	5 kN	1.1 kN	1.35 kN
Prefa fixed adhesion area, distance between two seam clamps on the same seam ≥ 400 mm	5 kN	0.725 kN	1.3 kN
Prefa sliding clamp area, distance between two seam clamps on the same seam ≥ 600 mm	5 kN	1.37 kN	1.38 kN
Prefa sliding clamp area, distance between two seam clamps on the same seam ≥ 400 mm	5 kN	0.915 kN	1.3 kN
Prefa long sliding clamp area, distance between two seam clamps on the same seam ≥ 600 mm	5 kN	1.5 kN	1.8 kN
Prefa long sliding clamp area, distance between two seam clamps on the same seam ≥ 400 mm	5 kN	1 kN	1.75 kN