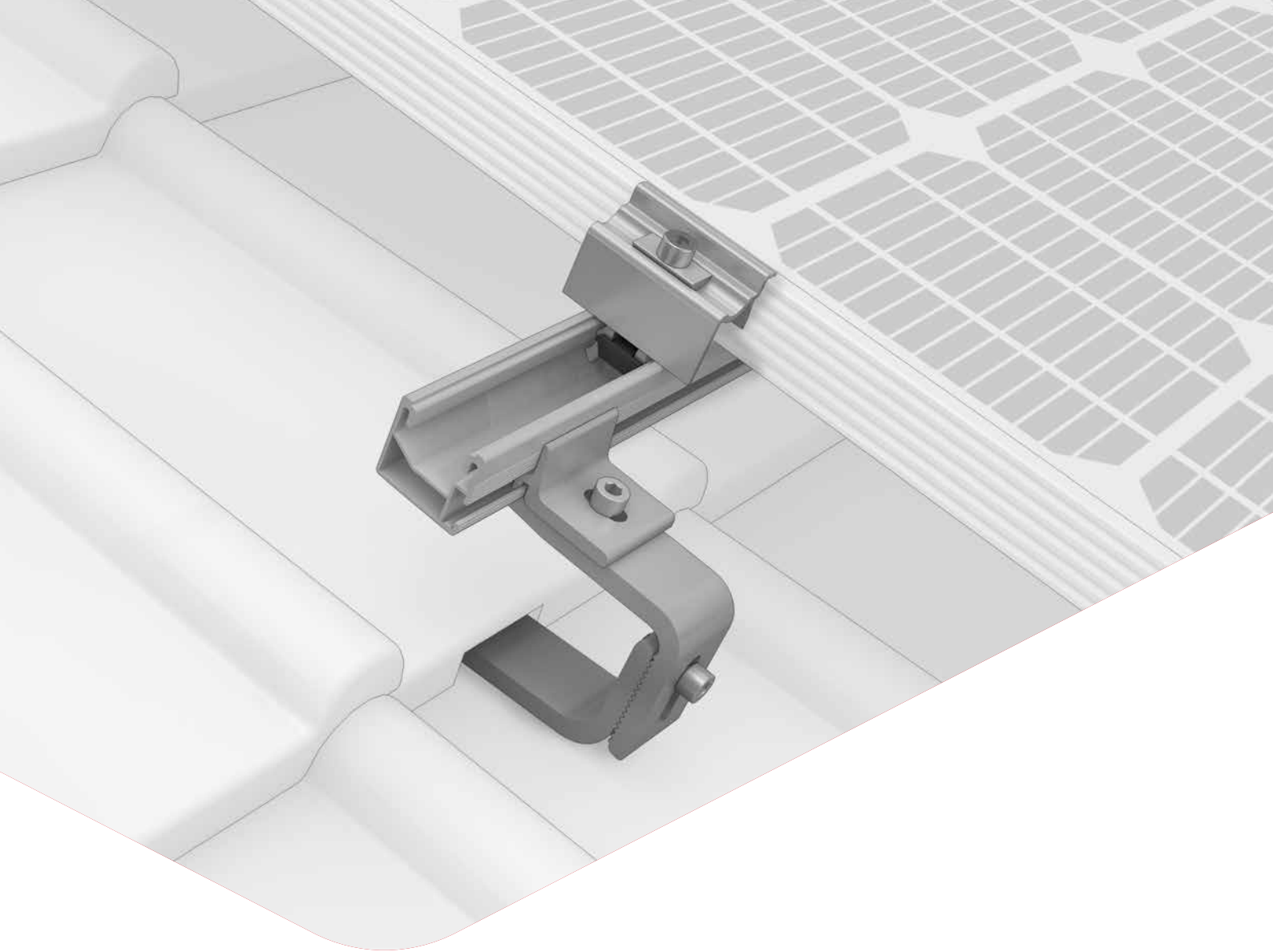


Manual

Attach K2 roof hooks with flange head screws

Content

Tested quality - certified several times

K2 Systems stands for secure connections, highest quality and precision. Our customers and business partners have known this for a long time. Independent bodies have tested, confirmed and certified our competences and components.

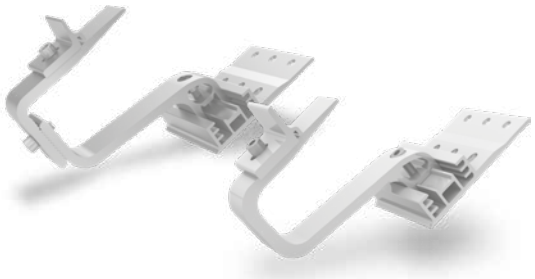
At k2-systems.com you will find our quality and product certificates.

Intruduction

The screw connection between K2 roof hooks and the roof substructure has the task of transferring the forces acting on the photovoltaic system via the roof hook and the screws into the supporting roof substructure and thus guaranteeing the stability of the photovoltaic system. K2 Systems recommends the use of HECO stainless steel screws for fastening its roof hooks. These are of high quality and ensure a secure and good corrosion-resistant connection.

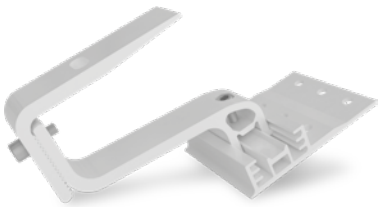
The round oblong hole pattern of the K2 roof hooks has been matched to the flat head screws in particular, so that the combination allows particularly powerful force transmission in compliance with the European Technical Approval (ETA).

K2 roof hook with round slotted hole pattern and flat head screw

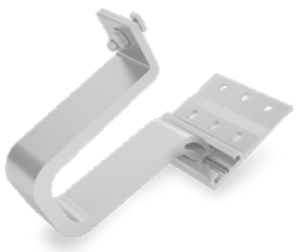


SingleHook 3S & SingleHook 4S
2003215 / 2003144

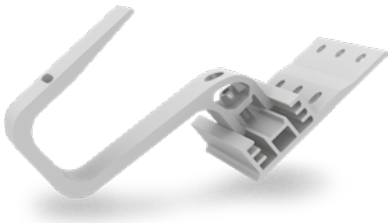
SingleHook Vario
2002651



SingleHook 1.1
2001928



SingleHook Alpin
2003155



SolidHook 3S+/4S+
2002390 / 2002402

Self-drilling solar wood construction screw with flange head

Dimension	Art.-Nr.
8 x 180	2004551
8 x 240	2004119
8 x 300	2004552

Self-drilling wood construction screw with flange head

Dimension	Art.-Nr.
6 x 80	2004106
6 x 100	2004107
8 x 80	2004111
8 x 100	2004112
8 x 120	2004113
8 x 160	2004115
8 x 180	2004116
8 x 200	2004117

Requirements

General

Before installing roof hooks, it must always be checked whether the roof is capable of bearing the additional load of a photovoltaic system and the resulting changed loads. This usually requires a structural analysis. In the case of existing roofs, the condition of the structure, in particular the load-bearing timbers, must also be inspected on site. The regionally valid building regulations in this regard must be observed.

If the conditions are met, the bolted connection must be calculated according to Eurocode 5. This takes into account the local conditions, the substructure of the building and the geometry of the roof hook. The calculation result shows whether the selected type and number of screws can transfer sufficient forces from the roof hook to the timber substructure.

The values required for the calculation for the plate head screw can be found in the particular ETAs. The calculation method is specified by Eurocode 5. The screws may be used for fastening steel and aluminum roof hooks to the following types of wood with certain minimum requirements: Solid softwood, glulam, laminated beams, cross laminated timber and laminated veneer lumber. Further details can be found in the ETAs.

- Heco TOPIX-plus ETA-19/0553
- Reisser ETA-11/0106
- Eurotec ETA-11/0024
- Schäfer + Peters ETA-11/0283

For screw traceability purposes, document the lot number and manufacturer indicated on the packaging and provide it to the screw manufacturer in case of problems or complaints.

Screw diameter

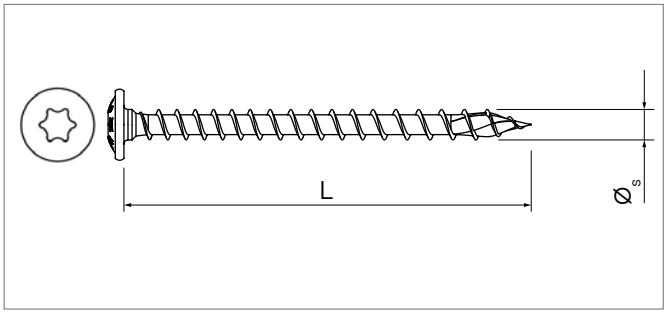
The choice of screw diameter depends both on the rafter geometry in order to maintain the necessary minimum edge distances and on the forces to be transmitted according to the Eurocode calculation. The round oblong hole pattern of the K2 roof hooks offers the geometric prerequisites for the use of screw diameters from Ø 6 mm to Ø 8 mm. For these, the connections were mathematically verified taking into account exemplary load assumptions/actions and the bolt resistances defined in the ETA. The minimum distance from the centre of the screw to the rafter edge must be at least three times the diameter (Ø 6 mm × 3 = 18 mm; Ø 8 mm × 3 = 24 mm). With Heco TOPIX-plus (Ø 8 mm), the minimum distance to the edge of the rafter is 17.5 mm.

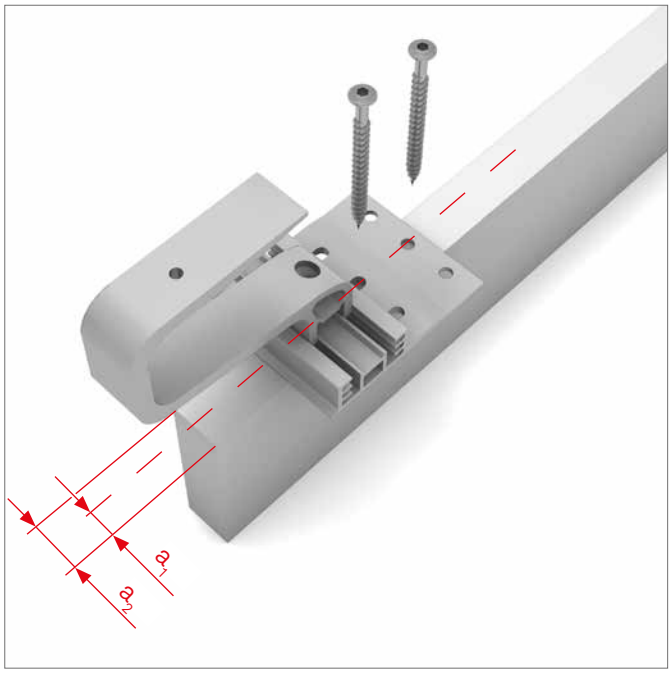
Screw length in relation to rafter height

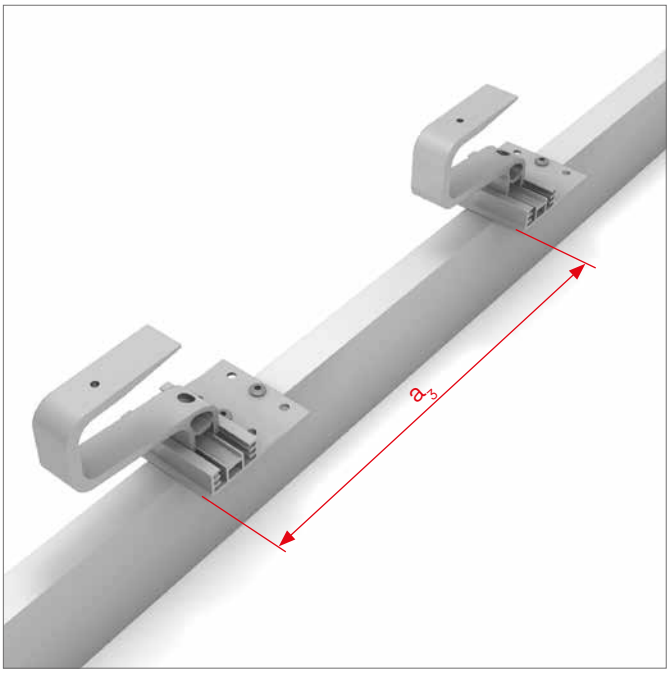
To ensure maximum stress, the penetration depth must be at least the diameter times 4 (Ø 6 mm × 4 = 24 mm; Ø 8 mm × 4 = 32 mm). Only then can the screw transfer the specified forces from the roof hook into the rafter.

Edge distances

Eurocode 5 and the European approval ETA specify the minimum embedment depth, minimum edge distances of the screw to the end of the rafter and to the unloaded lateral edge (a_1) of the rafter in relation to the screw diameter. The minimum distance between the roof hooks on a rafter (a_3) must also be taken into account. For K2 roof hooks with round oblong hole pattern in combination with flat head screws of the listed dimensions, the following distances apply:







Screw	K2 Art.Nr.	Ø$_s$ [mm]	L [mm]	Drive	Ø Predrilling [mm]	Max. screw in torque [Nm]	a_1 [mm]	Min. rafter width a_2 [mm]	a_3 [mm]
6×80	2004106	6	80	T25	4.0	5.3	18	36	150 **
6×100	2004107	6	100	T25	4.0	5.3	18	36	150 **
8×80	2004111	8	80	T40	Softwood: 5.0 Hardwood: 6.0	12.6	17.5*	45 *	200 **
8×100	2004112	8	100	T40	Softwood: 5.0 Hardwood: 6.0	12.6	17.5*	45 *	200 **
8×120	2004113	8	120	T40	Softwood: 5.0 Hardwood: 6.0	12.6	17.5*	45 *	200 **
8×160	2004115	8	160	T40	Softwood: 5.0 Hardwood: 6.0	12.6	17.5*	45 *	200 **
8×180	2004116	8	180	T40	Softwood: 5.0 Hardwood: 6.0	12.6	17.5*	45 *	200 **
8×200	2004117	8	200	T40	Softwood: 5.0 Hardwood: 6.0	12.6	17.5*	45 *	200 **

* Values refers to the manufacturer Heco, type TOPIX-plus. For the manufacturers Reisser, Eurotec and Schäfer + Peters, the minimum edge distance a1 is 24 mm and the minimum rafter width a2 is 48 mm.

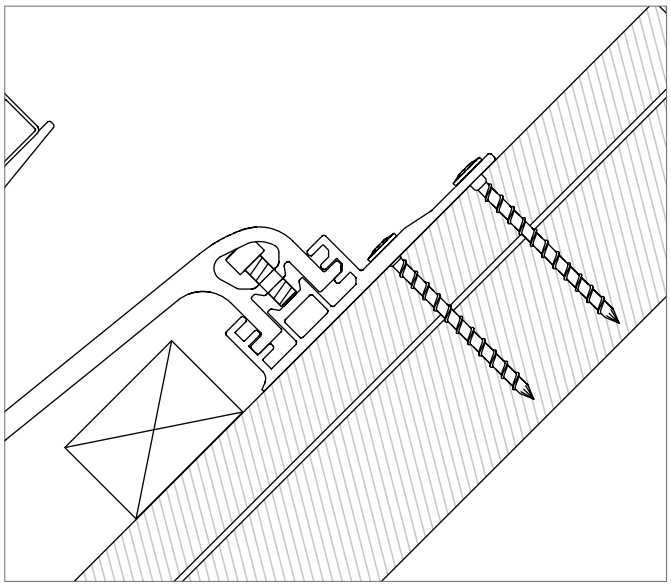
** For Douglas fir wood, the value must be increased by 50 %

a_1 Min. edge distance to the rafter side

a_3 Min. distance of roof hooks on one rafter

Installation

General



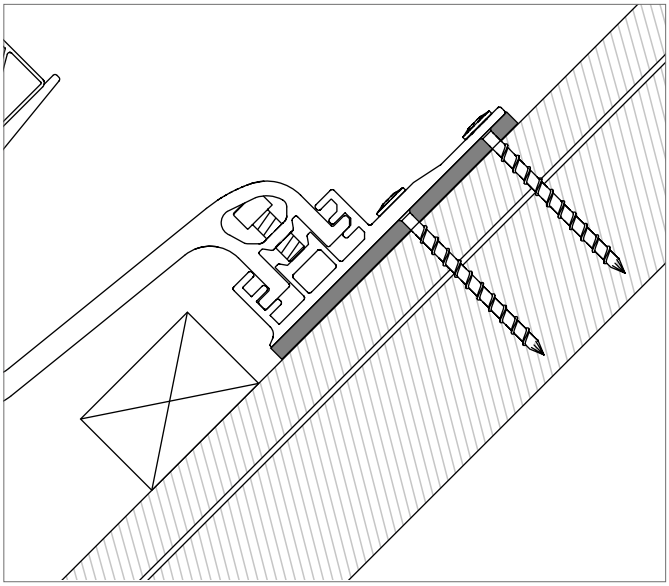
At least 2 screws must always be used to fasten a roof hook to the wooden substructure. The screws may be screwed with pre-drilling or without pre-drilling.

If the screw diameter is 8 mm, you may only screw without predrilling if the wood type of the substructure is softwood. If you have to predrill (for Ø 8 mm and wood type hardwood), the recommended drill diameter for 8 mm screws = 6 mm for hardwood (5 mm for softwood), for 6 mm screws = 4 mm.

Select as drive for shoring the screws for Ø 6 mm: T25 and for Ø 8 mm: T40. The maximum screw-in torque is 5.3 Nm for Ø 6 mm and 12.6 Nm for Ø 8 mm.

Select the appropriate setting on the cordless screwdriver. The plate head of the screw must lie flush and flat on the base plate of the roof hook after screwing in. The screw must be fully seated in the wood of the substructure, i.e., the tip of the screw must not protrude from the supporting solid wood. Exceptions are substructures with rooftop insulation and sufficiently high counter-battens – see the following chapter.

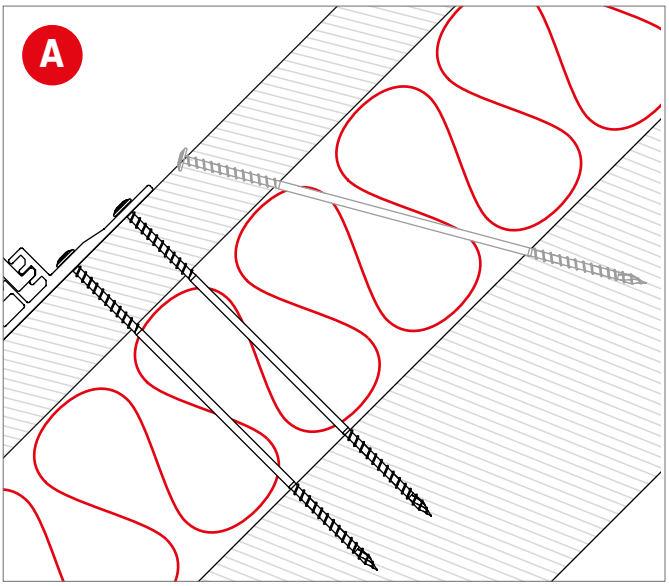
Underlay of the roof hook



If an underlay is required for height equalisation, it must not exceed the maximum permissible height according to the ETA of the respective screw.

It must be ensured that there is no relevant bending moment on the screw shaft. Our levelling plate (item no. 2002332), for example, can be used for height compensation.

With on-roof insulation

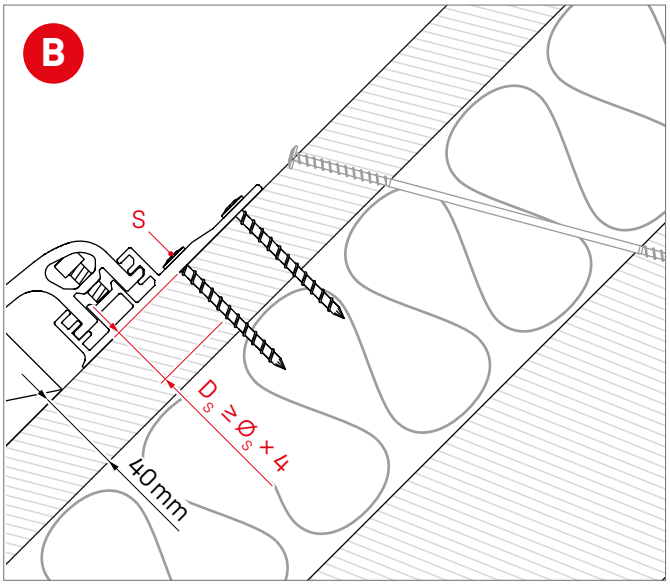


When fastening PV roof hooks to roof systems with existing on-roof insulation, the settlement and shrinkage behaviour of the insulation material and counter battens should be taken into account.

By using solar wood screws, the risk of roof hook "rattling" can be avoided.

When using a solar wood screw, the roof hook is permanently connected to the counter-batten. The right-angled pressure and suction loads are transferred directly into the rafters via the screw without additional stress on the insulation.

The minimum screw-in depth in the rafters must not be less than 40 mm; it is recommended that a screw-in depth of 60 mm is selected.



If there is on-roof insulation with sufficiently pressure-resistant insulation materials, the screw length of a fully threaded screw must be selected so that the minimum screw-in depth (D_S) of the screw in the counter batten is maintained. It is advisable to fasten the roof hooks in sufficiently dimensioned timber.

As a general rule, the minimum screw-in depth (D_S) is $4 \times Ø_S$ (for an 8 mm screw, the minimum screw-in depth is 32 mm).

It must be ensured that the pressure and suction loads from the roof hook are transferred to the supporting structure via the insulating material. It must be checked that the counter battens are sufficiently or additionally fastened to absorb the corresponding tensile, compressive and shear forces for the roof structure.

i The PV system generates an additional load on the roof structure. Among other things, this places additional shear stress on the counter battens, which must be taken into account when designing the over-rafter insulation. In addition to the right-angled compression and suction screw connections, an additional requirement for shear screws (usually inclined at approx. 60°) must be checked.

It should be noted that local conditions (e.g. snow and wind loads zones) can have a strong influence on the additional requirements for shear screws. These additional requirements must always be checked prior to installation.

Thank you for choosing a K2 mounting system.

Mounting ystems from K2 Systems are quick and easy to install. We hope these instructions have helped. Please contact us with any questions or suggestions for improvement. Our contact data:

- **k2-systems.com/en/contact**
- **Service Hotline: +49 (0)7159 42059-0**

Our General Terms of Business apply. Please refer: k2-systems.com

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Roof hooks - screws manual EN V8 | 0225 · Subject to change
Product illustrations are exemplary and may differ from the original.