Handbook

Attach K2 roof hooks with flat head screw

K2 systems

Connecting Strength

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Content

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

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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).
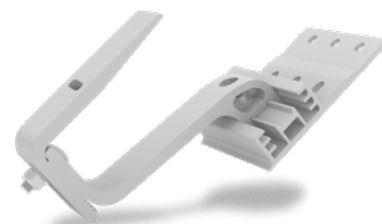
K2 roof hook with round slotted hole pattern and flat head screw
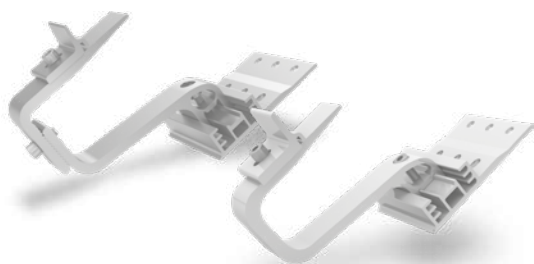
SingleHook 3S & SingleHook 4S
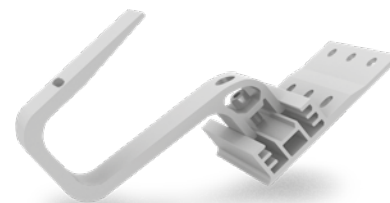2003215 / 2003144
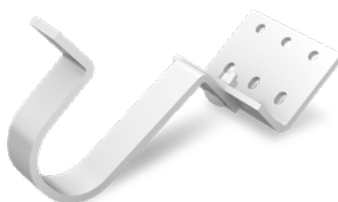
SingleHook Vario
2002651

SingleHook 1.1
2001928

SingleHook Alpin
2003155

SolidHook 3S+/4S+
2002390 / 2002402

Self-drilling wood construction screw with plate head

Abmessung	Art.-Nr.
6 × 80	2004106
6 × 100	2004107
8 × 80	2004111
8 × 100	2004112
8 × 120	2004113

Abmessung	Art.-Nr.
8 × 160	2004115
8 × 180	2004116
8 × 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

> **i** **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.

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 minimum edge distances of the screw to the end-grain end 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:
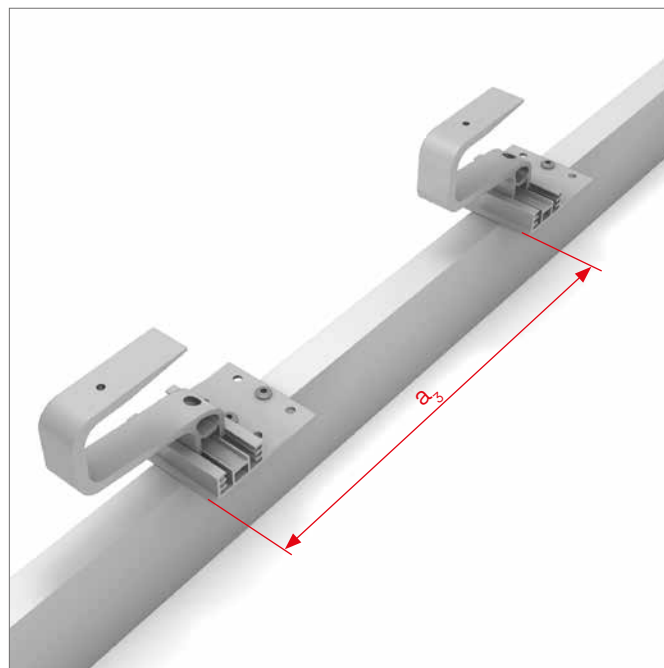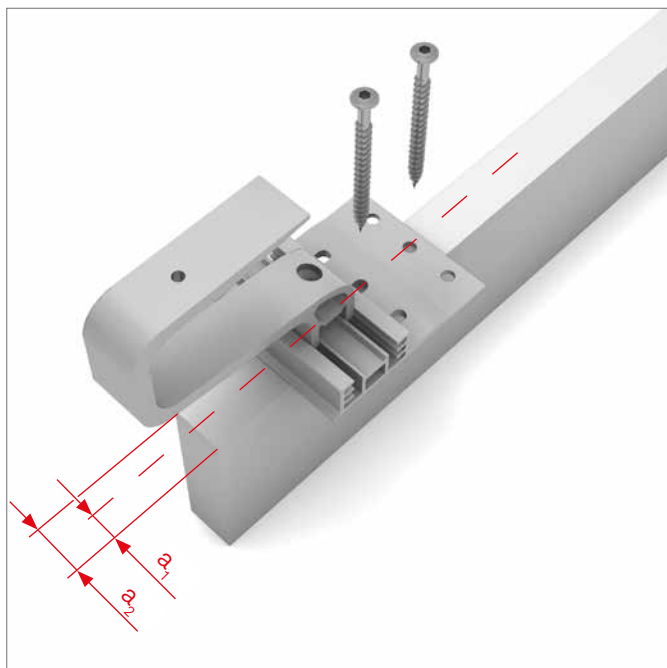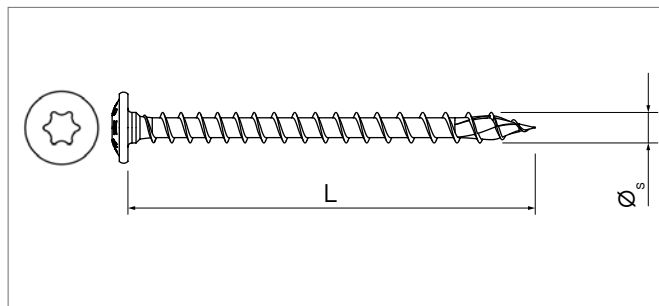
| Screw	K2 Art.Nr.	$\varnothing_s$ [mm]	L [mm]	Drive	Ø Predrilling [mm]	Max. screw in torque [Nm]	a_1 [mm]	Min. rafter width a_2 [mm]	a_3 [mm]
6×80	2004106	6	80	T25	4.0	5.3	18	36	150*
6×100	2004107	6	100	T25	4.0	5.3	18	36	150*
8×80	2004111	8	80	T40	Nadelholz: 5.0 Laubholz: 6.0	12.6	24	48	200*
8×100	2004112	8	100	T40	Nadelholz: 5.0 Laubholz: 6.0	12.6	24	48	200*
8×120	2004113	8	120	T40	Nadelholz: 5.0 Laubholz: 6.0	12.6	24	48	200*
8×160	2004115	8	160	T40	Nadelholz: 5.0 Laubholz: 6.0	12.6	24	48	200*
8×180	2004116	8	180	T40	Nadelholz: 5.0 Laubholz: 6.0	12.6	24	48	200*
8×200	2004117	8	200	T40	Nadelholz: 5.0 Laubholz: 6.0	12.6	24	48	200*

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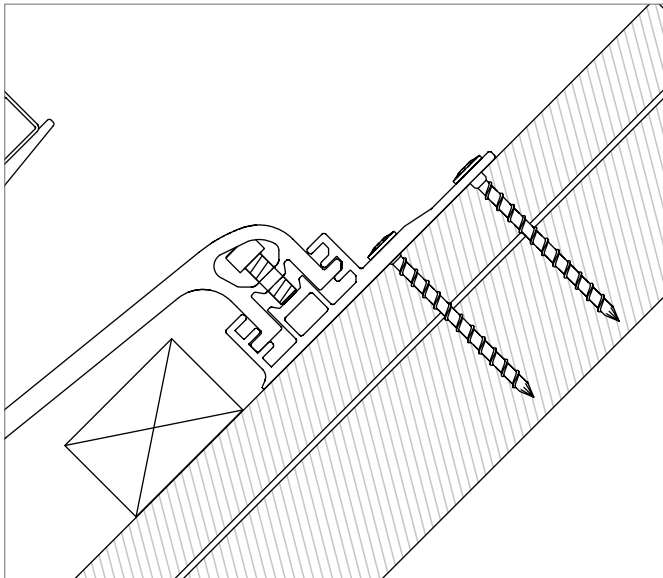
At least 2 screws must always be used to fasten a roof hook to the wooden substructure. The screws may be screwed with pre-drilling or without pre-drilling.

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
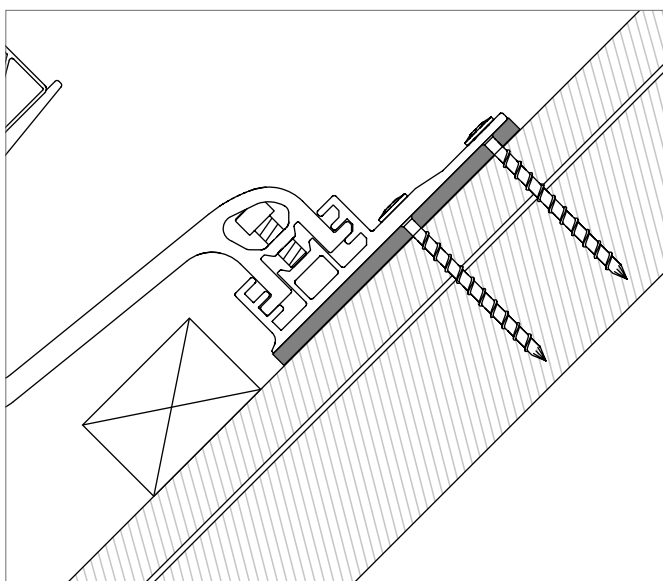
If the roof hook is underlaid for height compensation, the underlay must only be so high that the thread of the screw is still completely seated in the rafter timber and not, for example, in the underlay timber, as this cannot introduce tensile and transverse forces into the roof structure.

With on-roof insulation
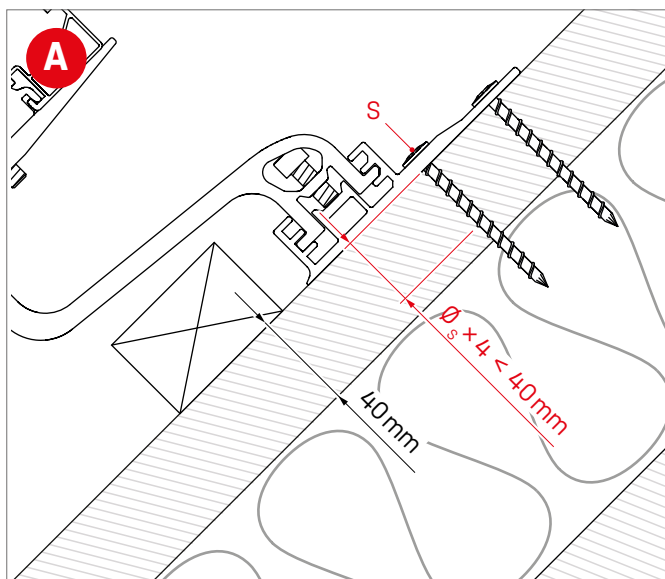
If on-roof insulation is present, the screw length must be selected so that the minimum screw-in depth of the screw in the rafter timber is maintained.

For screws (S) from the manufacturer Heco, the minimum screw-in depth is four times the screw diameter ($\emptyset_s$). If the screw has a diameter of 8 mm, the minimum screw-in depth is 32 mm (A) and can be screwed into a counter-battening with a height of 40 mm.

Please check the minimum screw-in depth of the screws you are using.
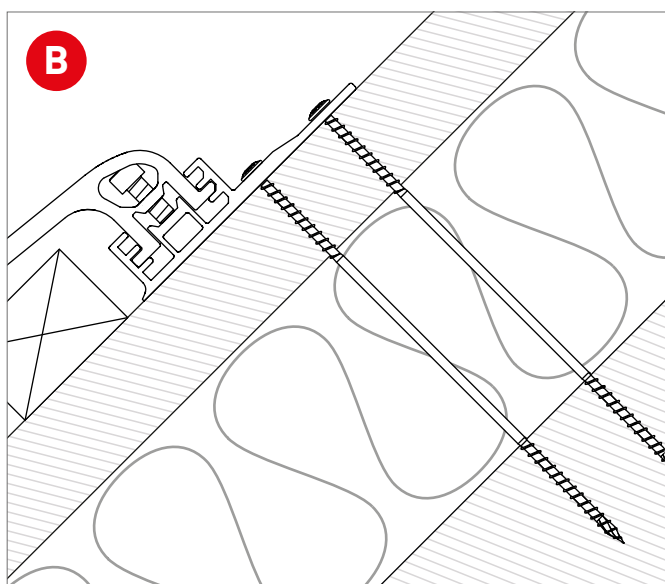
If these conditions are not met (A), special screws for rooftop insulation in pressure-soft and also pressure-resistant insulation materials must be used (B).

This is fixed in the counter-batten with its bottom thread. Compressive forces are thus transmitted via the counter batten to the screws. This prevents the counter batten from being pressed into the insulation material.

ℹ In both cases, the customer should check whether the fastening of the counter-battens can absorb sufficient shear / downslope forces. The bolting of the counter battens can be improved by additional lag screws.
The manufacturers' ETAs usually describe mechanical models and design aids for this purpose.

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**

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