European Technical Assessment ETA-16/0709 of 14/10/2016

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:	K2 Systems Crosshook 3S
Product family to which the above construction product belongs:	Three-dimensional nailing plate (roof brackets for fixing of photovoltaic systems on wooden roof constructions)
Manufacturer:	K2 Systems GmbH Industriestraße 18 D-71272 Renningen Tel. +49 71 59 42 059-0 Fax +49 71 59 42 059-177 Internet www.k2-systems.com
Manufacturing plant:	K2 Systems GmbH Industriestraße 18 D-71272 Renningen
This European Technical Assessment contains:	11 pages including 2 annexes which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	Guideline for European Technical Approval (ETAG) No. 015 Three Dimensional Nailing Plates, April 2013, used as European Assessment Document (EAD).
This version replaces:	

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

K2 solar roof brackets are two-piece non-welded connectors used to fix photovoltaic systems on wooden roof constructions. The roof brackets are produced of aluminium EN AW 6063 T66 according to EN 755-2 with minimum characteristic yield strength of $R_{p0,2} = 200$ N/mm² and minimum characteristic tensile strength of $R_m = 245$ N/mm².

For the connection of the base plate with the purlin stainless (1.4567) steel wood screws 6,0 x 80 mm according to ETA-11/0284 are used.

Dimensions are shown in Annex A and B.

2 Specification of the intended use in accordance with the applicable EAD

The roof brackets are intended for use in is the fixing of photovoltaic systems on wooden roof constructions, where requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 of Regulation (EU) 305/2011 shall be fulfilled.

The static behaviour of the timber members or the supports shall be as described in Annex B.

Annex B states the load-carrying capacities of the roof brackets for the load-cases compression, tension and shear relative to the roof plane. The design of the connections shall be in accordance with Eurocode 3 and Eurocode 5 or a similar national code.

The roof brackets are for use in timber structures subject to the service classes 1, 2 and 3 of Eurocode 5 and for connections subject to static or quasi-static loading. The metal fasteners must be of stainless steel.

The scope of the brackets regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the roof brackets of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability*) (BWR1)	
Characteristic load-carrying capacity	See Annex B
Stiffness	No performance determined
Ductility in cyclic testing	No performance determined
3.2 Safety in case of fire (BWR2)	
Reaction to fire	The roof brackets are made from aluminium classified as Euroclass A1 in accordance with EN 13501-1 and EC decision 96/603/EC, amended by EC Decision 2000/605/EC
3.3 Hygiene, health and the environment (BWR3)	
Influence on air quality	The product does not contain/release dangerous substances specified in TR 034, dated March 2012 0**)
3.7 Sustainable use of natural resources (BWR7)	No Performance Determined
3.8 General aspects related to the performance of the product	The roof brackets have been assessed as having satisfactory durability and serviceability when used in timber structures using the timber species described in Eurocode 5 and subject to the conditions defined by service class 1, 2 and 3

*) See additional information in section 3.9 – 3.12.

**) In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.9 Methods of verification
Safety principles and partial factors
The characteristic load-carrying capacities are based on testing.

As aluminium or screw withdrawal failure is decisive, the design value shall be calculated according to EN 1999-1-1 or EN 1995-1-1 by reducing the characteristic values of the load-carrying capacity with different partial factors.

The design value of the load-carrying capacity for compressive or shear loads is according to EN 1999-1-1:

$$F_{Rd} = \frac{F_{Rk,alu}}{\gamma_{M1}}$$

The design value of the load-carrying capacity for tensile loads is according to EN 1995-1-1:

$$F_{Rd} = \frac{k_{mod} \cdot F_{Rk,t}}{\gamma_M}$$

3.10 Mechanical resistance and stability
See Annex B for the characteristic load-carrying capacity in the different load-cases compression, tension and shear. Using the load-carrying capacities of the roof brackets, the specifications in Annex A must be fulfilled.

The characteristic capacities of the roof brackets are determined by testing according to Eurocode 9 and Eurocode 5. They should be used for designs in accordance with Eurocode 9 and Eurocode 5 or a similar national code.

No performance has been determined in relation to ductility of a joint under cyclic testing. The contribution to the performance of structures in seismic zones, therefore, has not been assessed.

No performance has been determined in relation to the joint's stiffness properties - to be used for the analysis of the serviceability limit state.

3.11 Aspects related to the performance of the product

3.11.1 Corrosion protection in service class 1, 2 and 3.
In accordance with ETAG 015 the roof brackets are produced from aluminium EN AW 6063 T66 according to EN 755-2 with minimum characteristic yield strength of $R_{p0,2} = 200$ N/mm² and minimum characteristic tensile strength of $R_m = 245$ N/mm².

3.12 General aspects related to the fitness for use of the product

K2 roof brackets are manufactured in accordance with the provisions of this European Technical Assessment using the manufacturing processes as identified in the inspection of the plant by the notified inspection body and laid down in the technical documentation.

The nailing pattern used shall be the maximum as defined in Annex B.

The following provisions concerning installation apply:

The structural members to which the brackets are fixed shall be:

- The timber members
  - shall be strength class C24 according to EN 14081 or better,
  - shall be free from wane under the connector base plate

- The fastener spacing, edge and end distances shall be chosen according to Eurocode 5.

- There are no specific requirements relating to preparation of the timber members.

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 97/638/EC of the European Commission1, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 2+.

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking

Issued in Copenhagen on 2016-10-14 by

Thomas Bruun
Managing Director, ETA-Danmark

Annex A
Product details and definitions

Table A.1 Specifications of the roof brackets

Roof Bracket		Identification	Metal Fasteners
Type	Dimension	Article-No.	Screws according to ISO 4762
CrossHook 3S Base plate	100 x 124 x 36 mm	2001129	M8x22 A2
CrossHook 3S	154 x 118 x 35 mm	2001534	M8x22 A2

Table A.2 Specifications of the metal fasteners according to ETA-11/0284

Fastener type (1.4567)	Size (mm)			Finish
	Diameter	Length	Thread Length	
wood screw 6,0 x 80 mm	6 mm	80 mm	60 mm	Stainless steel 1.4567

Annex B
Characteristic load-carrying capacities

Table B.1 Characteristic load-carrying capacities F_{Rk} for roof brackets "CrossHook 3S" with 2 or 4 wood screws 6,0 x 80 mm in kN

Roof Bracket			Compression	Shear	Tension
Type	Position	Number of screws			
CrossHook 3S	Central	2	1,65	1,20	1,50
	Eccentric*	4	1,56	1,18	1,67
* Any position deviating from the central position requires 4 screws					
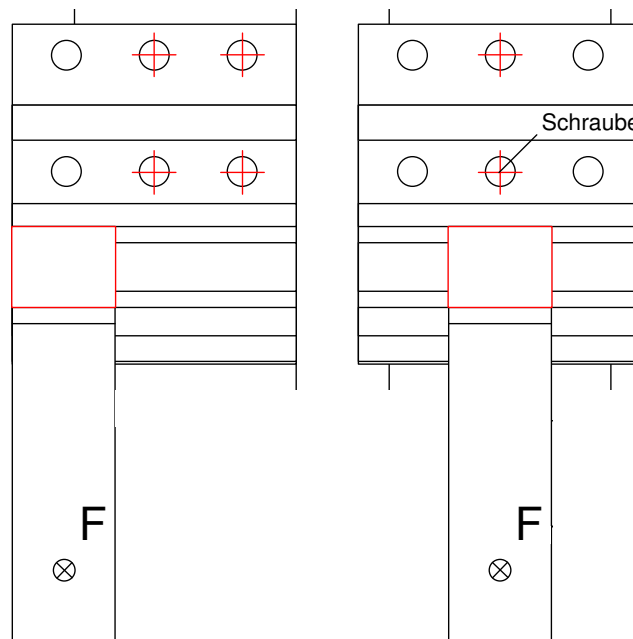
Figure B.1 Maximum eccentric position (left) with four screws 6,0 x 80 and central position (right) with two screws 6,0 x 80 for roof brackets "CrossHook 3S"

Combined forces
If the compression/tension and shear force act at the same time, the following inequality shall be fulfilled:

$$\sum \frac{F_{i,d}}{R_{i,d}} \leq 1$$

M8x22 ISO 4762 A2-70
tightening torque 16Nm

123/ 130/ 137 (preassembled 130)

115

56

40/ 47/ 54

96°

3,5

6

100

30

30

Ø8,5

8,5

3

124

224

M8

35

scale 1:5

	Name	Date	Material:		Item no.:			
			aluminium/ stainless steel			2000133		A4
Designed	V. Schuetz	16.01.2013						
Approved	M. Wiggers	17.01.2013	Surface:	blank	Drawing no.:	02-45-002		All dimensions in mm
Last change	V. Schuetz	23.01.2013	Weight:	ca. 0,53kg	Scale: 1:2 (1:5)	.		Sheet 1 of 1

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Designation:

Data sheet
RF CrossHook 3S

52,9

25,9

3,5

6

123,9

20

11,5(3x)

8,5(3x)

100

Ø 8,5(3x)

11

54

M 1:2

	Name	Date	Material:		Item no.:		2001129	A4
Designed	M. Wiggers	26.10.2016	Aluminium					
Approved	V. Schütz	26.10.2016	Surface: blank		Drawing no.:	02-46-00X		All dimensions in mm
Last change	xxx	xxx	Weight: not specified	Scale: 1:1 (1:2)		1:1		Sheet 1 of 1

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Designation:

DH CrossHook 3S
Base Plate

E

E-E (1 : 2)

115

69

M8 6H

118,2

8,5

Ø 14

M8 6H

154,4

35

M 1:2

	Name	Date	Material:		Item no.:		
Designed	M. Wiggers	26.10.2016	Aluminium			2001534	A4
Approved	V. Schütz	26.10.2016	Surface: blank		Drawing no.: 02-47-00x		All dimensions in mm
Last change			Weight: ca. 290g/piece	Scale:1:1 (1:2)			Sheet 1 of 1

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Designation:

DH CrossHook 3S
Bracket