

Report

ClickFit Mounting structure

Order number: 0104-B-12/3 Ref.: ARH/GZ

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Reference principal : 11-B-0885; Esdec B.V.

Subject : determination of the weather tightness /
resistance to wind driven rain

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Initials :



Pages : 11
Tables : 4
Annexes : 2

1 Introduction

By order of BDA Dakadvies B.V. BDA Keuringsinstituut B.V. (NL-4202 MS/35) has determined the weather tightness of two test specimens with the **ClickFit Mounting Structure** one on a roof buildup with Lafarge, concrete 'fast cover' tiles and one on a roof buildup with OVH 206 ceramic tiles.

On 13 April 2012 the samples, ClickFit Mounting Structure and tiles, were delivered at BDA Keuringsinstituut B.V. by Esdec B.V.

On the samples the following data were found.

Description mounting structure

- * Product : ClickFit Mounting Structure
- * Producer : Esdec B.V.

Description concrete tiles

- * Product : concrete 'fast cover' tiles
- * Producer : Lafarge
- * Dimensions : 420 mm × 332 mm

Description ceramic tiles

- * Product : OVH 206 ceramic tiles
- * Producer : Lafarge
- * Dimensions : 372 mm × 268 mm

See annex B for photos of the products and further package data.



2 Investigation

The weather tightness has been determined by performing wind driven rain tests in coherence with the stipulations mentioned in:

- * CEN/TR 15601:2012 – Hygrothermal performance of buildings – Resistance to wind driven rain of roof coverings with discontinuously laid small elements – Test method.
- * Draft MCS 012:2008 – Product Certification Scheme Requirements – Pitched Roof Installation Kits.

The wind driven rain tests have been performed on three systems.

- * The first system contains the ClickFit Mounting Structure fastened with four adjustable roof hooks (four hooks for each solar module), with on top of the system one solar module. The underlying roof covering elements are concrete 'fast cover' tiles on a substructure of tile laths, the centre to centre distance of the tile laths is 335 mm, the slope of the roof is 25°.
- * The second system contains the ClickFit Mounting Structure fastened with four adjustable roof hooks (four hooks for each solar module), with on top of the system one solar module. The underlying roof covering elements are concrete 'fast cover' tiles on a substructure of tile laths, the centre to centre distance of the tile laths is 345 mm, the slope of the roof is 30°.
- * The third system contains the ClickFit Mounting Structure fastened with respectively four and six adjustable roof hooks (four and three hooks for each solar module), with on top of the system one and two solar modules. The underlying roof covering elements are OVH 206 ceramic tiles on a substructure of tile laths, the centre to centre distance of the tile laths is 313 mm, the slope of the roof is 25°.

At all these systems the solar modules have been replaced by wooden dummies.

All the other parts are the original parts as used in practice.

De dimensions of the wooden dummies are 1600 mm × 800 mm × 40 mm.



The performance of the underlying roof covering elements which are unaffected by the presence of the mounting structure has been taken as a benchmark on which the performance of the mounting structure shall be assessed. To be acceptable the mounting structure inclusive the solar modules shall have a level of performance at least equal to that of the unaffected roofing elements. A reference test has been carried out with the test roof wholly constructed with underlying roofing elements, at the same conditions.

The wind driven rain tests have been performed on the wind-rain combinations B and D. First the combination B and D have been tested on the underlying roof covering elements, subsequently the combination B has been tested on the mounting structure inclusive the solar modules (dummy). After the necessary set up of the mounting structure inclusive the solar modules has been determined, the combination D is tested on the same test specimen.

The test conditions for wind-rain combination B and D for climate zone northern Europe, coastal are set at:

Combination B at a slope of 25°

- * Windspeed : 13 m.s⁻¹, after correction (slope) 9,9 m.s⁻¹
- * Rainfall : 99 mm.h⁻¹
- * Run off water : 16,5 mm.h⁻¹

Combination D at a slope of 25°

- * Windspeed : 0 m.s⁻¹
- * Rainfall : 204 mm.h⁻¹
- * Run off water : 34 mm.h⁻¹

Combination B at a slope of 30°

- * Windspeed : 13 m.s⁻¹, after correction (slope) 9,2 m.s⁻¹
- * Rainfall : 104 mm.h⁻¹
- * Run off water : 17,3 mm.h⁻¹

Combination D at a slope of 30°

- * Windspeed : 0 m.s⁻¹
- * Rainfall : 195 mm.h⁻¹
- * Run off water : 32,5 mm.h⁻¹



The tests have been performed in the laboratory of BDA Keuringsinstituut B.V. (NL-4202 MS/24) by Mr B. Middag of BDA Dakadvies B.V. The tests have been supervised by Mr A.R. Hameete and Mr C.W. van der Meijden MSc of BDA Keuringsinstituut B.V.

In total nine tests have been performed on the following data.

Table 1 – Performed tests

Test specimen	Wind-rain combination	Date	System
1 A	B and D	2013.02.11	unaffected roofing elements concrete 'fast cover' tiles at a slope of 25°
1 B	B	2013.02.14	roofing elements concrete 'fast cover' tiles at a slope of 25°, inclusive one dummy, tiles not grinded at the position of the adjustable roof hook
1 C	B and D	2013.02.19	roofing elements concrete 'fast cover' tiles at a slope of 25°, inclusive one dummy, two tiles (at the left side of solar panel) grinded at the position of the adjustable roof hook
2 A	B and D	2013.02.22	unaffected roofing elements concrete 'fast cover' tiles at a slope of 30°
2 B	B	2013.02.22	roofing elements concrete 'fast cover' tiles at a slope of 30°, inclusive one dummy, tiles not grinded at the position of the adjustable roof hook
2 C	B and D	2013.02.22	roofing elements concrete 'fast cover' tiles at a slope of 30°, inclusive one dummy, two tiles (at the left side of solar panel) grinded at the position of the adjustable roof hook



Table 1 – Performed tests (continuation)

Test specimen	Wind-rain combination	Date	System
3 A	B and D	2013.04.03	unaffected roofing elements OVH 206 ceramic tiles at a slope of 25°
3 B	B	2013.04.04	roofing elements OVH 206 ceramic tiles at a slope of 25°, inclusive one dummy, tiles not grinded at the position of the adjustable roof hook
3 C	B and D	2013.04.12	roofing elements OVH 206 ceramic tiles at a slope of 25°, inclusive two dummies, four tiles (two at the left side of left solar panel and two at the right side of the right solar panel) grinded at the position of the adjustable roof hook

In annex A a photo report of the test and the test results is given.

The turbulence intensity of the apparatus, the measurement of the initial pressure, the calibration of the fan system, rain generation and run-off water devices has been described in BDA-report 10-B-0939.02 dated 2013.01.29.



3 Construction of the test specimen

On respectively 6 February, 21 February and on 5 March 2013 the test specimens have been built up by Mr B. Middag and Mr R. Bikker of BDA Dakadvies B.V. under supervision of Mr A.R. Hameete of BDA Keuringsinstituut B.V.

The test specimens have been built up according to the prescription of the principal.
The following products have been used (see also table 1).

Test specimens, type 1 (concrete 'fast cover' tiles / slope of 25°)

- * Substructure : Test apparatus with a substructure of tile laths, the centre tot centre distance of the tile laths is 335 mm
- * Tiles : Lafarge, concrete 'fast cover' tiles
- * ClickFit Montage Systeem : - adjustable roof hook
- support rail
- module clamp
- end clamp
- mounting screw
- * Solar module : 1 dummy

Test specimens, type 2 (concrete 'fast cover' tiles / slope of 30°)

- * Substructure : Test apparatus with a substructure of tile laths, the centre tot centre distance of the tile laths is 345 mm
- * Tiles : Lafarge, concrete 'fast cover' tiles
- * ClickFit Montage Systeem : - adjustable roof hook
- support rail
- module clamp
- end clamp
- mounting screw
- * Solar module : 1 dummy



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Test specimens, type 3 (OVH 206 ceramic tiles / slope of 25°)

- * Substructure : Test apparatus with a substructure of tile laths,
the centre to centre distance of the tile laths is 313 mm
- * Tiles : OVH 206 ceramic tiles
- * ClickFit Montage Systeem : - adjustable roof hook
- support rail
- module clamp
- end clamp
- mounting screw
- * Solar module : 1 dummy or 2 dummies

The dimensions of the test specimens are 2,5 m × 2,0 m (length × width). The edges of the external surface of the test specimens have been sealed to the edges of the test chamber using a butyl roofing repair tape.



4 Results

**Table 2 – ClickFit Mounting Structure fastened with four adjustable roof hooks
 (four hooks for each solar module) with one solar module in combination
 with concrete ‘fast cover’ tiles, at a slope of 25°**

Test specifications		Test results [leakage in grams] <i>test specimen I wind-rain combination</i>				
Pressure [Pa]	Time [min]	1A		1B	1C	
		<u>B</u>	<u>D</u>	<u>B</u>	<u>B</u>	<u>D</u>
0	5	0	0	0	0	0
10	5	0	-	0	0	-
20	5	0	-	10	0	-
30	5	0	-	23	1	-
40	5	2	-	41	4	-
50	5	25	-	90 ¹⁾	-	-
60	5	-	-	-	-	-

¹⁾ Reference leakage (10 g.m⁻².(5.min)⁻¹) occurs.



**Table 3 – ClickFit Mounting Structure fastened with four adjustable roof hooks
 (four hooks for each solar module) with one solar module in combination
 with concrete ‘fast cover’ tiles, at a slope of 30°**

Test specifications		Test results [leakage in grams] test specimen / <u>wind-rain combination</u>				
Pressure [Pa]	Time [min]	2A		2B	2C	
		<u>B</u>	<u>D</u>	<u>B</u>	<u>B</u>	<u>D</u>
0	5	0	0	0	0	0
10	5	0	-	5	0	-
20	5	0	-	19	0	-
30	5	0	-	31	2	-
40	5	0	-	42	8	-
50	5	12	-	90 ¹⁾	35	-
60	5	-	-	-	-	-

¹⁾ Reference leakage (10 g.m⁻².(5.min)⁻¹) occurs.



**Table 4 – ClickFit Mounting Structure fastened with six adjustable roof hooks
 (three hooks for each solar module) with two solar modules in combination
 with OVH 206 ceramic tiles, at a slope of 25°**

Test specifications		Test results [leakage in grams] test specimen / <u>wind-rain combination</u>				
Pressure [Pa]	Time [min]	3A		3B	3C	
		<u>B</u>	<u>D</u>	<u>B</u>	<u>B</u>	<u>D</u>
0	5	0	0	0	0	0
10	5	0	-	0	0	-
20	5	1	-	2	0	-
30	5	7	-	17	4	-
40	5	17	-	110 ¹⁾	19	-
50	5	82 ¹⁾	-	234	34	-
60	5	-	-	-	57 ¹⁾	-

¹⁾ Reference leakage (10 g.m⁻².(5.min)⁻¹) occurs.

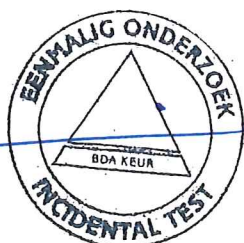
Remark:

The results are only related to the investigated samples, products and/or systems.
 BDA Keuringsinstituut B.V. is not liable for interpretations or conclusions that were made
 in consequence of the results obtained. In case the sampling has not been performed by
 BDA Keuringsinstituut B.V., no judgement can be given with regard to the origin and
 representativity of the samples.

Gorinchem, 2013.04.26

The laboratory

A.R. Hameete
operational manager



BDA Keuringsinstituut B.V.

C.W. van der Meijden MSc
deputy director



Photo 1
Overview of wind-rain combination B on test specimen 1A.



Photo 2
Overview of wind-rain combination D on test specimen 1A.



Photo 3
Buildup of test specimen 1B.



Photo 4
Overview of wind-rain combination B on test specimen 1C.

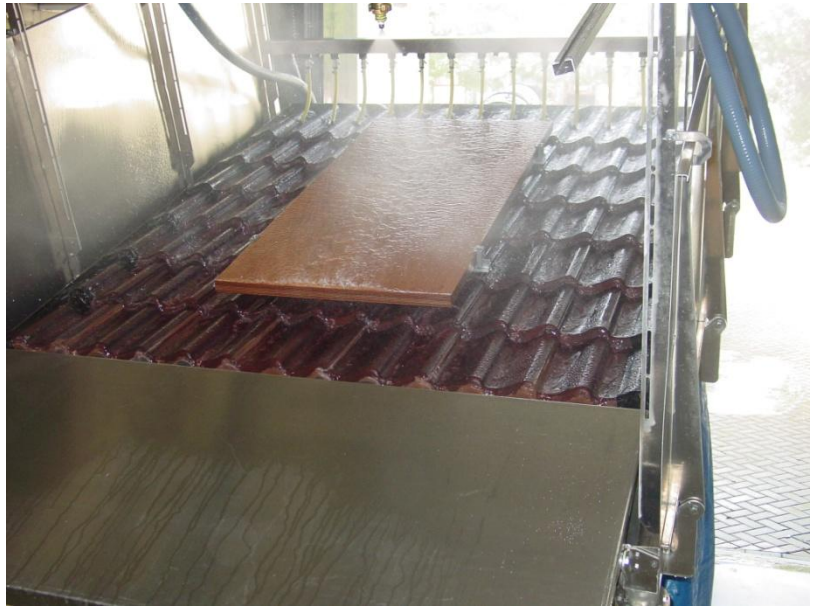


Photo 5
Detail of wind-rain combination B on test specimen 1C.

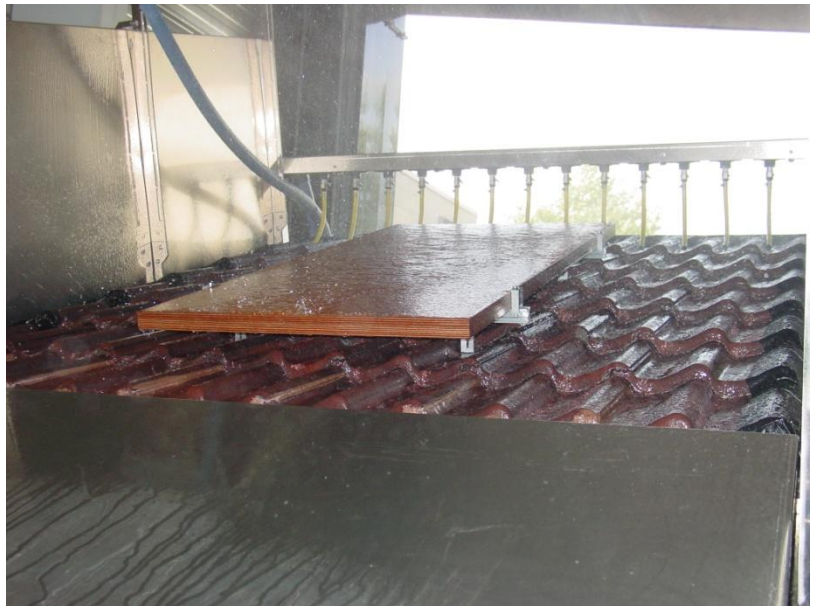


Photo 6
Overview of wind-rain combination D on test specimen 1C.



Photo 7
Overview of test specimen 3A.



Photo 8
Overview of wind-rain combination B on test specimen 3A.

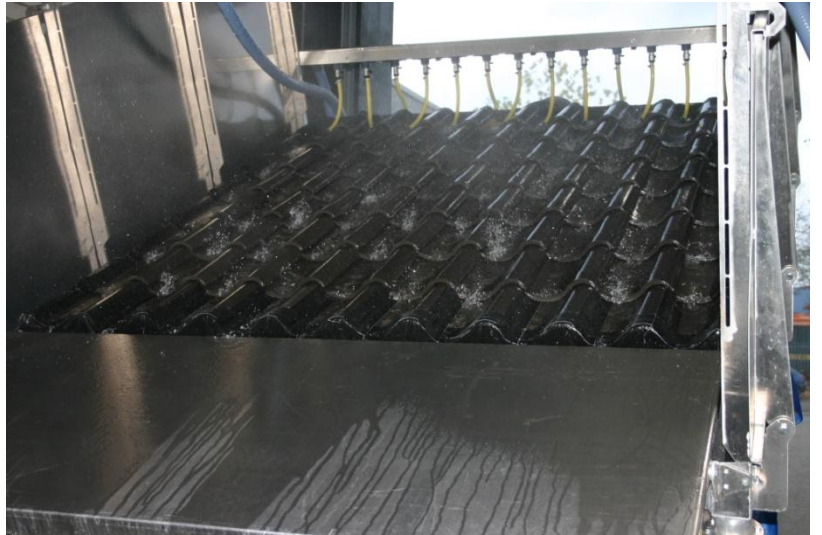


Photo 9
Overview of wind-rain combination D on test specimen 3A.



Photo 10
Detail of wind-rain combination D on
test specimen 3A.



Photo 11
Detail of test specimen 3B.



Photo 12
Detail of test specimen 3B, tile not grinded.



Photo 13
Detail of test specimen 3B, tile grinded.



Photo 14
Overview test specimen 3C.

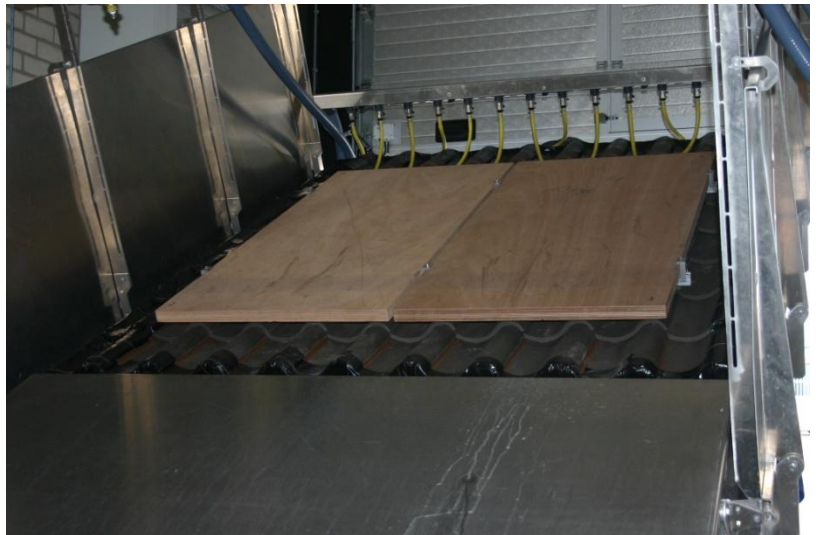


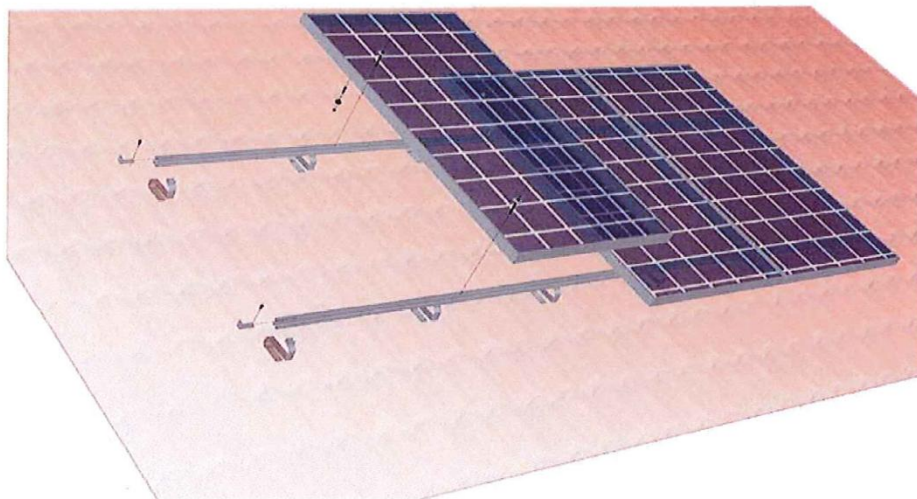
Photo 15
Overview of wind-rain combination B on test specimen 3C.



Package data

The ClickFit installation guide for tiled roofs

More info | www.click-fit.com



Material

A ClickFit assembly set contains the following items:

- | | |
|-------------------------------|-----------------------------|
| 1 roof hooks | 4 end clamp with screws |
| 2 mounting rail | 5 module clamps with screws |
| 3 coupling strips with screws | 6 Nylon slyves with srcrews |

Tools needed

- 1 Ratchet with socket 10

The ClickFit installation guide for tiled roofs

More info | www.click-fit.com



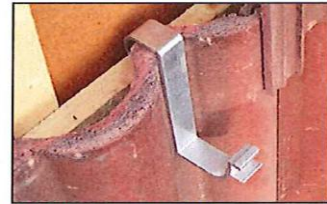
1. Preassembly of the nylon sleeves

Use the holes in the frame of the solar module to fix the nylon sleeves. Use the M6 nut and bolt to fixate the sleeves onto the solar panel at the same side as the connection box. The solar panel is temporarily mounted on the rail with the nylon sleeves. (see point 5.)



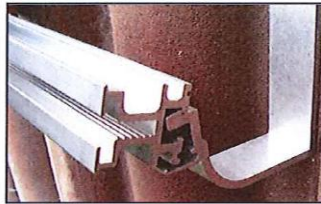
2. Preassembly of coupling strips

When combining multiple rails you have to use the coupling strips to extend the mounting rails. You simply slide the coupling strip in the side of the mounting rail and fixate it with the short mounting screws.



3. Placing the roof hooks

Divide the roof hooks evenly over the mounting rails. It is advised to place an extra roof hook in edge or corner zones. The roof hooks are placed over the battens and the roof tiles. Most of the times the roof tiles easily slide upwards underneath the upper laying roof tile. This gives you enough space to fixate the roof hook onto the batten in the lower part of the roof tile. This will fit in most of the times. In some occasions the roof tile needs to be grinded down a bit to make a snug fit. When the roof hooks are fixated slide the roof tile back into place. The next step is to determine where the next mounting rail will be mounted and place the roof hooks accordingly. The mounting rails are placed at $\frac{1}{4}$ from the bottom and top of the solar module.



4. Fixating the mounting rails

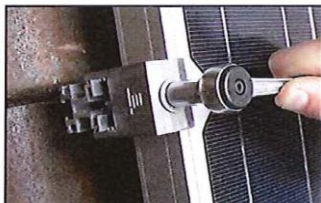
Hang the rails on the roof hooks. Click the mounting rail onto the roof hooks. Make sure that it Click is made firmly. It can be handy to use the mounting wedge which is placed between the roof hooks and the roof tile. This makes it easier to Click.



5. Hang the solar module on the rail

Temporarily hang the solar module on the rail with the nylon sleeves. As a result you have both hands free when mounting the solar modules.

Make sure that the mounting rails are aligned in one line above each other



6. Mounting the first panel on the mounting rails

You can now fixate the first module. Hang the module on to the mounting rail on the preassembled nylon sleeves. Slide the solar module to the side towards the end of the mounting rail. Slide the end clamp onto the mounting rail. Make sure you choose the right slot for the particular solar module frame height. Now fixate the solar module with the long mounting screws.




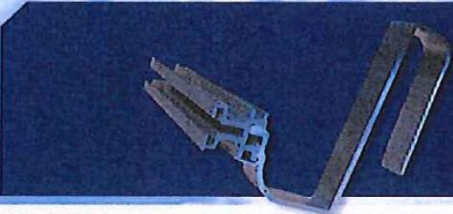

7. Mounting the other solar panels

Hang the second solar panel on the rail and slide it towards the first until a gap remains of about 7mm. Now fix the panel with the long screw and the module clamps. Make sure that the solar panels are aligned before tightening the screws. Repeat this with the remaining solar panels. For the mounting of the last solar panel see 6.



8. Mounting more rows of solar modules underneath each other

To get one solid surface of solar panels when there are multiple rows, you can slide the solar panels up after you hanged the on there sleeves against the upper row of solar panels. Now fixate the solar modules on the rails with the long mounting screws and the brackets.



The ClickFit mounting structure for tiled roofs

Das ClickFit Montagesystem für Ziegeldach
Het ClickFit montagesysteem voor pannendak

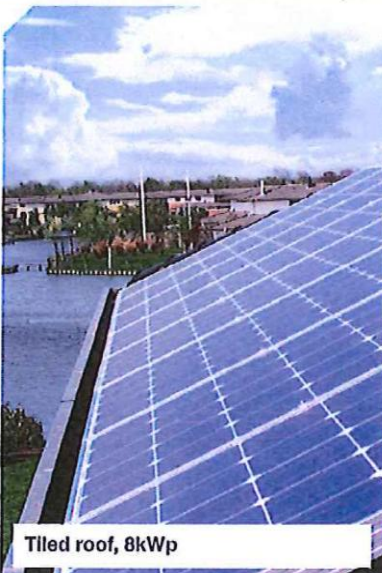
ClickFit for tiled roofs:
The mounting structure is composed out of the patented roof hooks, mounting rail and small components to mount the solar modules on to the mounting rail. The system can be used for every type of tiled roof irrespective of the type of roof tile.

Roof connection:
The roof hooks are fixed on the battens. The location of the modules on the roof can be chosen freely because the roof hooks are not fixed on the rafters or trusses. Height variations in the roof can easily be levelled with use of the height adjustment piece or the adjustable roof hook.

Mounting of the rail:
The rail is fixed on the roof hooks trough a click joint. No further tools or hardware are needed.

Mounting of the solar modules:
Nylon sleeves which are fixed on the solar module make the installation of the solar modules on the rail easy. The modules are being fixed on the mounting rail with the use of universal module clamps, end clamps and mounting screws. The mounting screws are screwed directly into a special formed thread in the mounting rail.

Needed tools:
Ratchet 10mm



Tiled roof, 8kWp

ClickFit für Ziegeldach:
Das System ist aufgebaut aus patentierten Dachhaken und Schienen und die benötigte Kleinteile um die Module zu montieren. Das ClickFit Montagesystem für Ziegeldach kann für alle Ziegeldächer benutzt werden ungeachtet der Ziegelart.

Dachmontage:
Die Dachhaken werden an die Lattung befestigt. Dadurch dass die Dachhaken nicht an die Sparren montiert werden ist man frei die platz von die Solarmodulen zu wählen. Höhenausgleich ist einfach durch ein spezielles Höhenausgleichteil oder durch die verstellbaren Dachhaken.

Befestigung von der Schiene:
Der Schiene wird an die Dachhaken befestigt durch einen Klick Verbindung. Hierzu braucht man keine Werkzeuge oder Kleinteile.

Kreuzschienensystem:
Das ClickFit System kann auch als Kreuzschienensystem benutzt werden für zum Beispiel waagrechte Montage von den Modulen. Man benutzt ein Kreuzverbinder für die Verbindung von die Schienen.

Benötigte Werkzeuge:
Ratsche 10mm


ClickFit voor pannendak:
Het montagesysteem is opgebouwd uit de gepatenteerde dakhaken, montagerails en de benodigde montage materialen om de zonnepanelen op de montagerail te monteren. Het ClickFit montagesysteem voor pannendak kan voor alle type pannendaken worden gebruikt ongeacht het type dakpan.


Dakbevestiging:
De dakhaken worden aan de panlatten bevestigd. Doordat de dakhaken niet worden bevestigd aan de daksporen of dakspanten kan men de plaats van de zonnepanelen op het dak vrijelijk bepalen. Hoogte verschillen in het dak kunnen eenvoudig worden uitgevuld doormiddel van een speciaal opklik blokje of door gebruik van de verstelbare dakhaak.

Bevestiging van de montagerail:
De montagerail wordt aan de dakhaken bevestigd middels een klikverbinding. Hiervoor zijn geen verdere materialen of gereedschappen nodig.

Bevestiging van de panelen:
De handige montagehulp draagt bij aan de snelle en veilige montage en dient tevens als afzijdig beveiliging. De zonnepanelen worden vastgezet door middel van een universele paneelklem, eindklemmen en montage schroeven. De montage schroeven worden direct in de montagerail geschroefd waarin een speciale schroefdraad is aangebracht.

Benodigde gereedschappen:
Ratel 10mm.





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 TÜV
 TÜV Rheinland
 ID: 000018404

01 Art. nr. 100-2001
ROOF HOOK STANDARD (30-39mm)
DACHHAUK STANDARD (30-39mm)
 DACHHAUKSTANDAARD (30-39mm)

Art. nr. 100-2010
ROOF HOOK MEDIUM (40-50mm)
DACHHAUK MEDIUM (40-50mm)
 DACHHAUK MEDIUM (40-50mm)

Art. nr. 100-2020
ROOF HOOK WIDE (51-63mm)
DACHHAUK BREIT (51-63mm)
 DACHHAUK BREED (51-63mm)

03 Art. nr. 100-3085
HEIGHT ADJUSTMENT PIECE (15mm)
HÖHE AUSGLEICH TEIL (15mm)
 OPHOOG BLOKJE (15mm)

04 Art. nr. 100-1001
MOUNTING RAIL
TRÄGERPROFIL
 MONTAGERAIL

05 Art. nr. 100-2080
CROSS CONNECTOR
KREUZVERBINDER
 KRUISVERBINDER

06 Art. nr. 100-3040
COUPLING STRIP
SCHIENENVERBINDER
 KOPPELSTRIP

07 Art. nr. 100-3020
MODULE CLAMP (bracket)
MITTELGLEMME
 MODULEKLEMPLAAT

08 Art. nr. 100-3003
END CLAMP CFA
ABSCHLUSSKLEMME CFA
 EINDKLEM CFA
 Frame: 60,49 - 48,46 - 42,41
 38,37 - 34,33 - 30,29mm

09 Art. nr. 100-3004
END CLAMP CFB
ABSCHLUSSKLEMME CFB
 EINDKLEM CFB
 Frame: 62,61 - 48,47 - 44,43
 40,39 - 36,35 - 32,31mm

10 Art. nr. 100-65 **
MOUNTING SCREW
MONTAGESCHRAUBE
 MONTAGESCHROEF

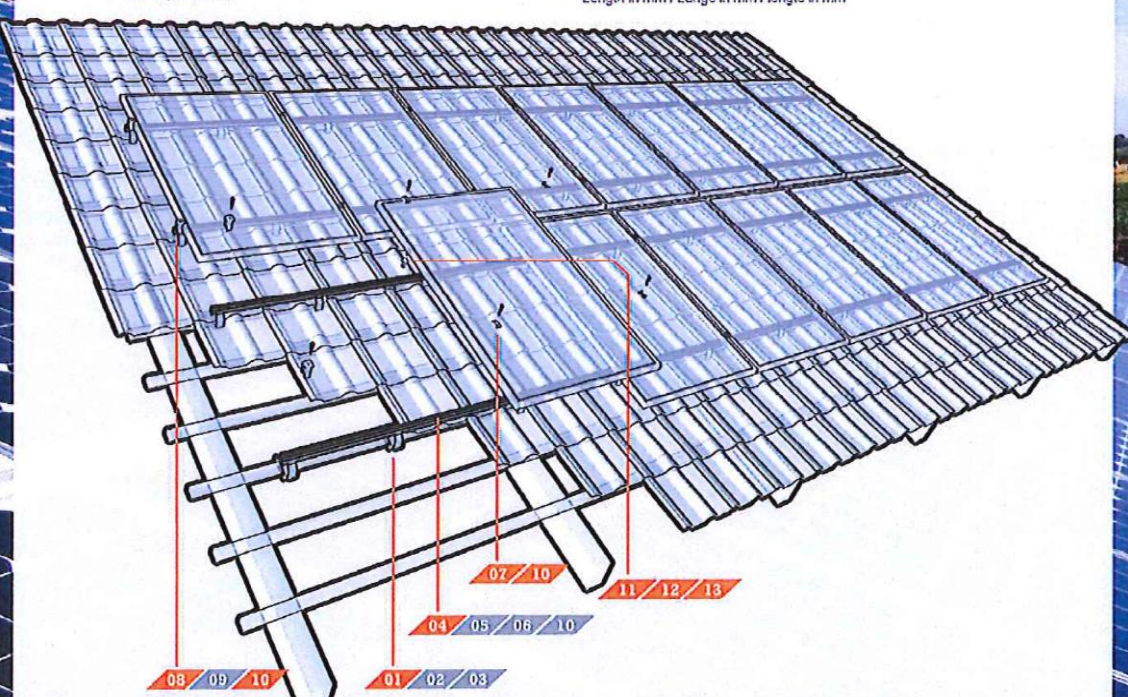
11 Art. nr. 100-9001
NYLON SLEEVE
AUFLANG BUCHE
 NYLON OPHANG-BUS

12 Art. nr. 100-0620
M6X20 STAINLESS STEEL BOLT
M6X20 EDELSTAHL SCHRAUBE
 M6X20 RVS BOUT

13 Art. nr. 100-0600
M6 STAINLESS STEEL NUT
M6 EDELSTAHL MUTTER
 M6 RVS MOER

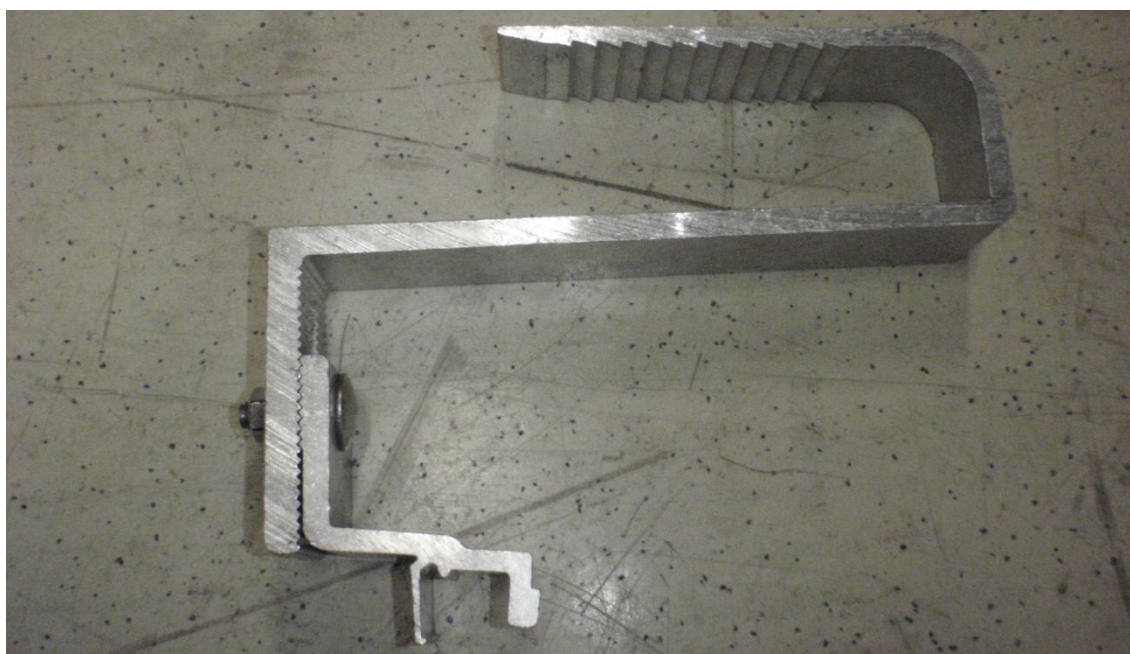
* Also available with hole / Auch Lieferbar mit Loch / Ook leverbaar met gat
 standard/standaard: 100-2003 / medium: 100-2012 / wide/breit/breed: 100-2022

** Length in mm / Länge in mm / lengte in mm



www.Click-fit.com
 info@click-fit.com

ClickFit Mounting structure





Tiles

Concrete 'fast cover' tiles



OVH 206 ceramic tiles

