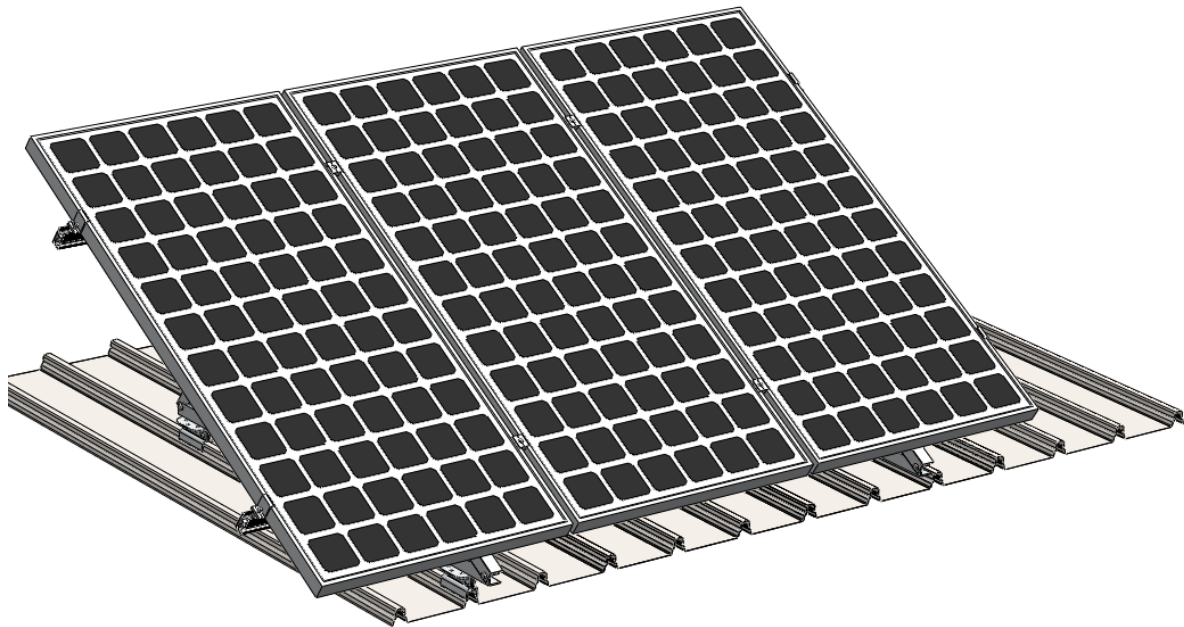




## KlipLok Roof Brackets Installation Guide





## 1. Introduction

### 1.1 Intended use

- Are intended to be used by individuals with sufficient technical skills for the task. Knowledge and use of hand tools, measuring devices and values is also required.
- Include various precautions in the forms of Notes, Cautions, and Warnings. These are to assist in the assembly process and/or to draw attention to the fact that certain assembly steps may be dangerous could cause serious personal injury and/or damage to components. Following the step-by-step procedures and these precautions should minimize the risk of any personal injury or damage to components making the installation not only safe but an efficient process.

### 1.2 Service life warranty

Grace Solar provides a warranty of 10 years for the service life of all materials used.

### 1.3 Safety

The following basic safety instructions and warning symbols form an essential part of this manual and are of fundamental importance when handling this product.

- Do not remove or disable any safety devices
- Comply with the relevant safety regulations.
- The presence of a second party who can provide help in the event of an accident is obligatory during the entire installation process.
- Keep a copy of this installation manual in the immediate vicinity of the system.

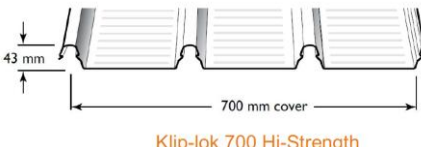

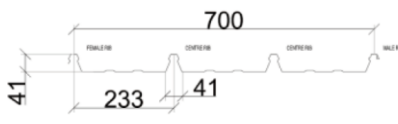

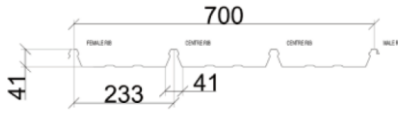

### 1.4 Responsibilities of the owner/operator

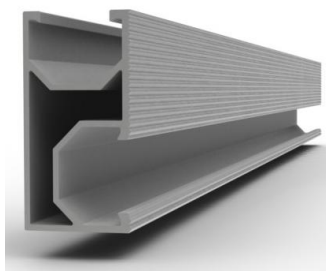
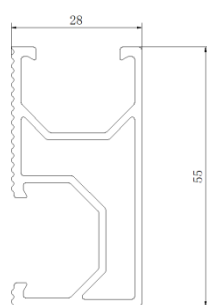

The system operator has the following safety-related responsibilities:

- To ensure that installation of the system is only carried out by individuals with specialist technical knowledge and basic knowledge of mechanical engineering.
- To ensure that those commissioned to perform the work can evaluate their assigned tasks and recognize possible risks.
- To ensure that those commissioned to perform the work are familiar with the system components.
- To ensure that the installation manual is available during installation. The installation manual is an integral part of the product.
- Ensure that the installation manual, and in particular the safety instructions, are read and understood by the relevant personnel before installation.
- Ensure that the permissible operation conditions are observed. Mounting systems is not liable for damage occurring when these conditions are not adhered to.
- Ensure the durability of all connections and the attachment of the system.
- Ensure that suitable lifting gear is used for installation.
- Ensure that only Mounting System components are used when parts need to be replaced. Otherwise any warranty claim is null and void







## 2. Components List

Roof Type	Picture	Item No.	Description
 <p>Klip-lok 700 Hi-Strength</p>		GS-IK-S07-A	Standing Seam Roof Hook 7# A
 <p>Klip-Lok 406 &amp; Klip-Lok 700</p>		GS-IK-SK7-110	Standing Seam Roof Hook SK7-110
 <p>Klip-Lok 406 &amp; Klip-Lok 700</p>		GS-IK-SK7-A	Standing Seam Roof Hook SK7-A







<b>GD-Rail</b> <ul style="list-style-type: none"><li>✓ hold each panel row</li><li>✓ length can be customized</li><li>✓ 6005-T5 extruded aluminum</li></ul>		 
Standard Rail Length		
808~826mm wide panels	990~1020mm wide panels	
2560mm		
3405mm	4200mm	
<b>GD-Rail Splice Kit</b> <ul style="list-style-type: none"><li>✓ Extend GD-Rail to any length as required by the quantity or width of the solar panels</li></ul>		



<p><b>Inter Clamp Kit for Framed Modules</b></p> <ul style="list-style-type: none"> <li>✓ Fit between two panels</li> <li>✓ Fastened with a 6mm Allen key</li> <li>✓ Standard pre-assembly for the usual panels with thickness 30, 35, 40, 46, 50, 57mm</li> </ul>	
<p><b>End Clamp Kit for Framed Modules</b></p> <ul style="list-style-type: none"> <li>✓ Hold the edge of each end panels</li> <li>✓ Fastened with a 6mm Allen key</li> <li>✓ Standard pre-assembly for the usual panels with thickness 30, 35, 40, 46, 50, 57mm</li> </ul>	
<p><b>Support Leg</b></p>	
<p><b>Adjustable Front Leg</b></p> <ul style="list-style-type: none"> <li>✓ Pre-assembly</li> <li>✓ Include 2pcs st6.3x80 wood screws</li> </ul>	
<p><b>Adjustable Rear Leg</b></p> <ul style="list-style-type: none"> <li>✓ Pre-assembly</li> <li>✓ Adjust angle from 10 deg to 60 deg</li> <li>✓ Include 2pcs st6.3x80 wood screws</li> </ul>	



## 3. Installation Tools

✓ 6mm Allen key or hexagonal driver	
✓ Cordless Drill; Match with 6mm driver bits	
✓ Gloves; Protect the hazard of sharp corners	
✓ Cord or color pen; Mark the installation position	
✓ Spirit level About 1 meter	
✓ Ruler	





## 4. code-compliant AS/NZS 1170 planning

### 4.1 Determine the wind region of your installation site

#### Region Definition:

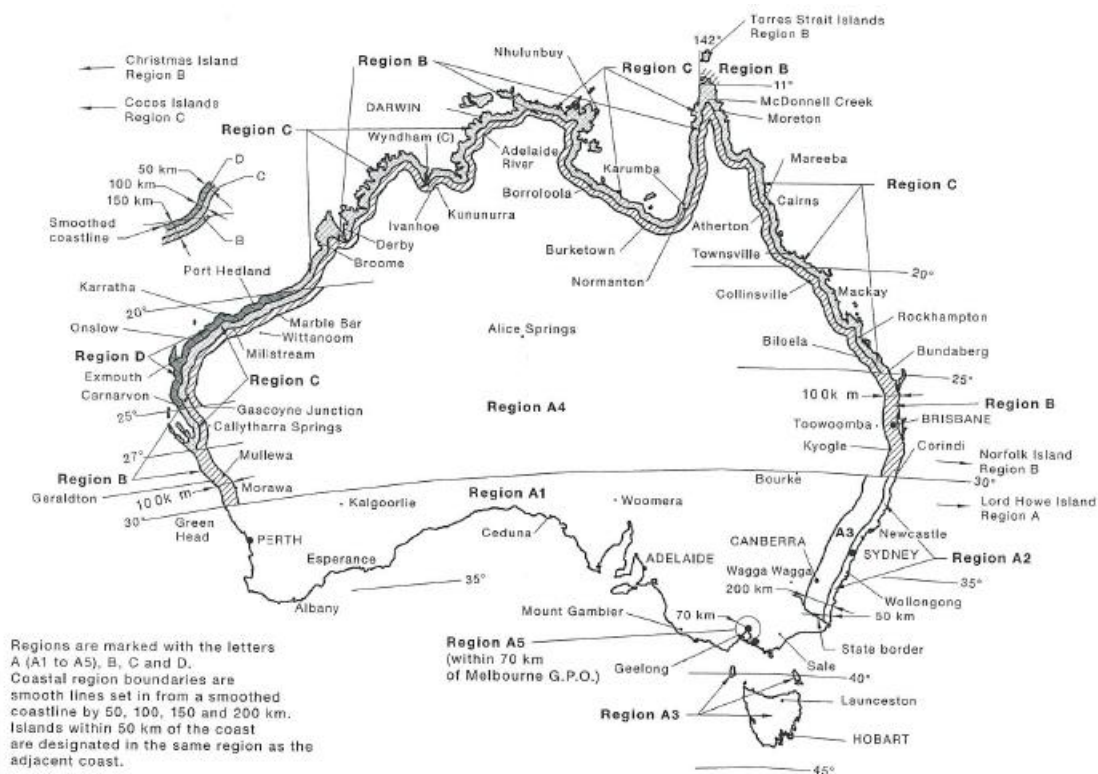


FIGURE 3.1(A) WIND REGIONS

Wind regions are pre defined for all of Australia by Australian Standard 1170. The Wind Region has nothing to do with surrounding topography or buildings.

- Most of Australia is designated Region A which indicates a Regional Ultimate Basic Wind Velocity of 45msec.
- Some areas are designated Region B (57msec). Local authorities will advise if this applies in your area.
- Region C areas (66msec) are generally referred to as Cyclonic and are generally limited to northern coastal areas. Most Region C zones end 100km inland.
- Region D (80msec) Australia's worst Cyclonic Region between Carnarvon and Pardoo in Western Australia.



## 4.2 Determine the height of the of your installation site

This document provides sufficient information for Grace solar system installation height less than 20 meters. If your installation site is more than 20 meters in height, please contact Grace solar to obtain engineering data to support your installation.

## 4.3 Verify acceptable Rail End Overhang

Rail End Overhang must equal 50 percent or less of foot spacing. Thus, if foot spacing is 1200mm, the Rail End Overhang can be up to 600mm. In this case, two feet can support a rail of as much as 2400mm (1200mm between the feet and 600mm of overhang at each end).

## 4.4 Determine Roof slope

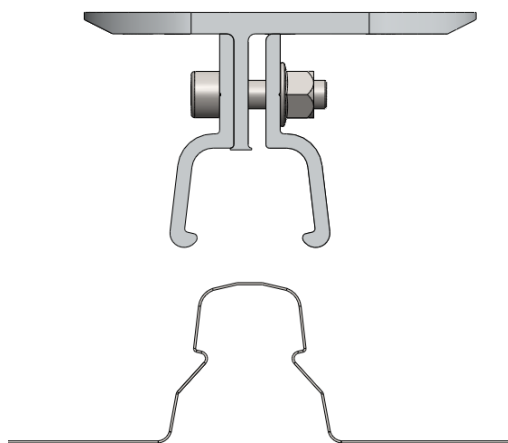
Grasol system can be used for roof slope up to 60 degrees. Please verify the Installation site roof slope should be between 0 degrees and 60 degrees.

## 4.5 Determine Roof Installation Roof Areas

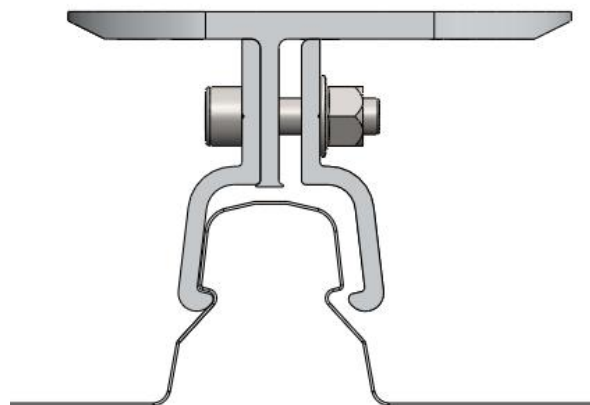
Grasol Tilt System can be installed using those spacing everywhere on the roof.

## 4.6 Determine the maximum KlipLok Roof Brackets Spacing

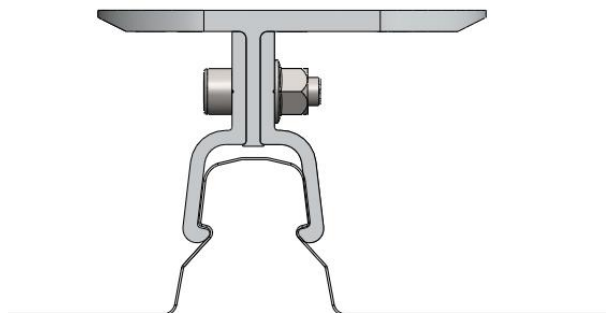
4.6.1 Install the Clamp kits of GS-IK-S07-A and GS-IK-SK7-A and GS-IK-SK7-110.



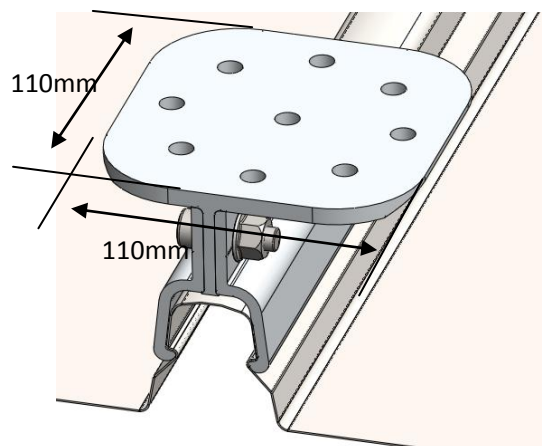
Loose screw, open the clamp



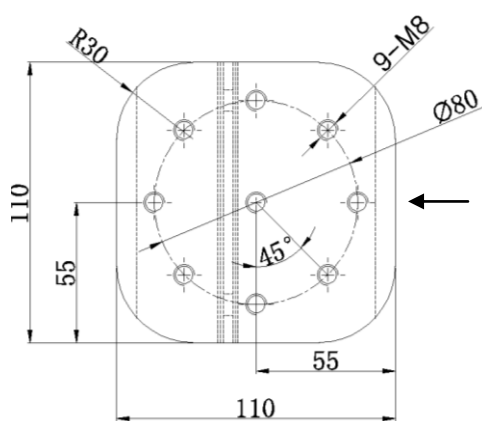
Delegate it on the roof



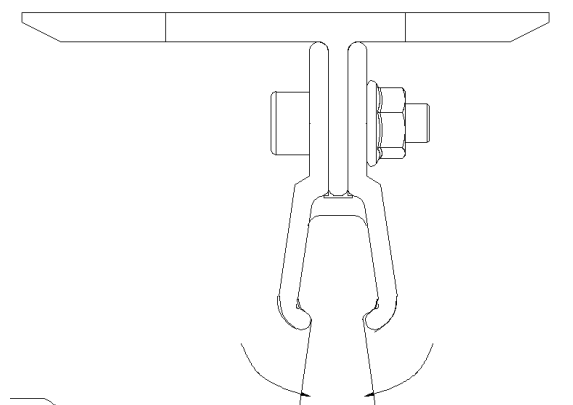
Tight the screw



Installation finished



The dimension of Top Support

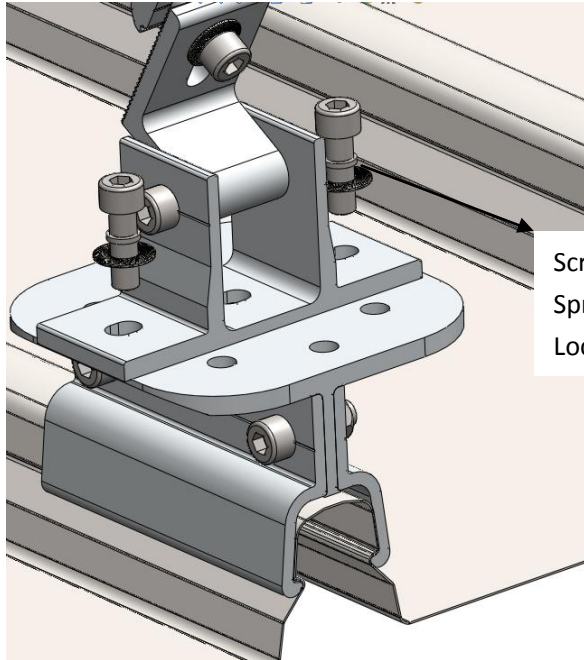


GS-IK-SK7-110 Installation Guide



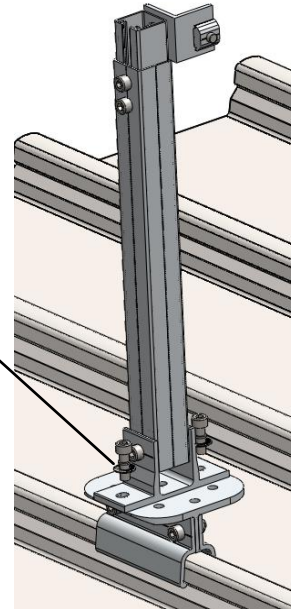


## 4.6.2 Install with Adjustable bracket



Install AD Front leg

Screw M8\*16  
Spring washer  
Lock washer

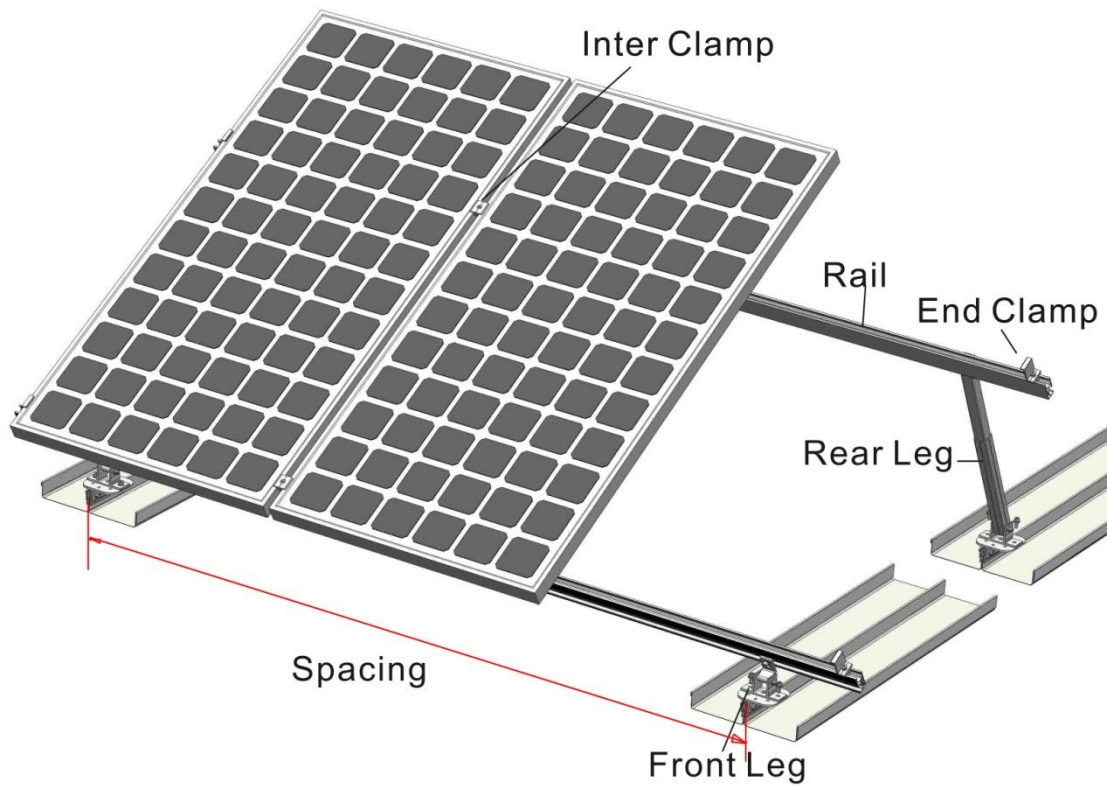


Install AD Rear Leg

b. Other parts' installation according to the adjustable brackets installation guide.

## 4.6.3. Installation Spacing

Please use the following table to determine the GD-Rail support spacing for the tilt system installations.



## SUMMARY - T.C. 2 for Regions A, B, C

Roof Interface Bracket Spacing (mm) Across for PV – Tripod and Adjustable Tilting System

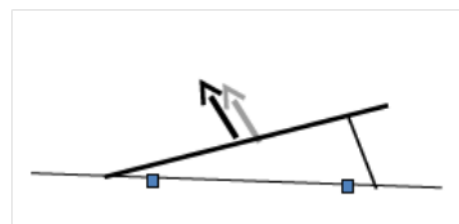
Fixing anywhere on the Roofing sheet

Two Klip-Lok per frame

### Design Data

KlipLok Type	Capacity kN
Lysaght 406	0.4
Lysaght 700	0.87
Fielders 700	0.43

Panel 'L' 1970





WIND REGION	A							
qu (K Pa)	0.68	0.84	0.82	0.92	0.91	1.11	0.96	1.18
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30
KlipLok 406	540	430	450	400	400	330	380	310
KlipLok 700	1180	950	970	870	880	720	830	680
KingKlip 700	580	470	480	430	430	350	410	330
Force (kN/m)	0.74	0.91	0.89	1.00	0.99	1.20	1.04	1.28

WIND REGION	B							
qu (K Pa)	0.87	1.15	1.05	1.38	1.15	1.52	1.22	1.61
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30
KlipLok 406	420	320	350	260	320	240	300	220
KlipLok 700	920	690	760	580	690	520	650	490
KingKlip 700	450	340	370	280	340	260	320	240
Force (kN/m)	0.94	1.25	1.14	1.50	1.25	1.65	1.32	1.74

WIND REGION	C							
qu (K Pa)	1.33	2.29	1.61	2.54	1.77	2.79	1.88	2.95
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30
KlipLok 406	270	160	220	N/A	200	N/A	190	N/A
KlipLok 700	600	350	490	310	450	280	420	270
KingKlip 700	290	170	240	150	220	N/A	210	N/A
Force (kN/m)	1.44	2.48	1.74	2.75	1.92	3.02	2.04	3.20

1. Roof Interface bracket spacing in the above table for panel length of 1.97 m.
2. The table prepared based on GD Rail capacity and Klip-Lok bracket pull-out capacity
3. This tables refer to using Klip-Lok type interface with Adjustable Tilt Leg using 2-M8 bolts for the connection and also with single Tripod using 2-M8 bolts for connection.
4. Max. distance allowed from the end of the single Tripod base to fixing of the Klip-lok bracket is 225 mm.
- 5 The above mentioned spacing table is for Roof Interface Bracket fixing including edge of the roof.
6. On purlin means that distance from the purlin to the Klip-Lok type bracket( centre to centre) is not more than 100mm
7. Angle refers to tilt angle between roof and panels – not to horizontal.
8. For panels ranging in length 1580 to 1700mm increase spacings by 9%
9. For panels ranging in length 1700 to 1800mm increase spacings by 11.5%
10. For panels ranging in length 1880 to 1970mm adopt tabulated spacings

## SUMMARY - T.C. 2 for Regions A, B, C



Roof Interface Bracket Spacing (mm) Across for PV – Tripod and Adjustable Tilting System

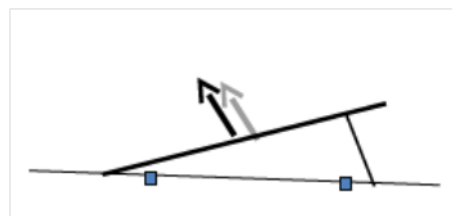
fixing on purlin on the Roofing sheet

Two Klip-Lok per frame

## Design Data

KlipLok Type	Capacity kN
Lysaght 406	1.37
Lysaght 700	1.17
Fielders 700	0.5

Panel 'L' 1970



WIND REGION	A							
qu (K Pa)	0.68	0.84	0.82	0.92	0.91	1.11	0.96	1.18
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30
KlipLok 406	1490	1430	1430	1400	1400	1340	1310	1070
KlipLok 700	1490	1430	1430	1400	1400	970	1120	910
KingKlip 700	670	540	560	500	500	410	480	390
Force (kN/m)	0.74	0.91	0.89	1.00	0.99	1.20	1.04	1.28

WIND REGION	B							
qu (K Pa)	0.87	1.15	1.05	1.38	1.15	1.52	1.22	1.61
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30
KlipLok 406	1420	1090	1200	910	1090	830	1030	780
KlipLok 700	1420	930	1020	780	930	710	880	670
KingKlip 700	530	400	430	330	400	300	370	280
Force (kN/m)	0.94	1.25	1.14	1.50	1.25	1.65	1.32	1.74

WIND REGION	C							
qu (K Pa)	1.33	2.29	1.61	2.54	1.77	2.79	1.88	2.95
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30
KlipLok 406	950	550	780	490	710	450	670	420
KlipLok 700	810	470	670	420	610	380	570	360
KingKlip 700	340	200	280	180	260	160	240	150
Force (kN/m)	1.44	2.48	1.74	2.75	1.92	3.02	2.04	3.20





1. Roof Interface bracket spacing in the above table for panel length of 1.97 m.
2. The table prepared based on GD Rail capacity and Klip-Lok bracket pull-out capacity
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10. For panels ranging in length 1880 to 1970mm adopt tabulated spacings

## SUMMARY - T.C. 3 for Regions A, B, C

Roof Interface Bracket Spacing (mm) Across for PV – Tripod and Adjustable Tilting System

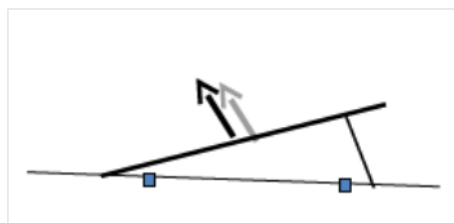
Fixing anywhere on the Roofing sheet

Two Klip-Lok per frame

### Design Data

KlipLok Type	Capacity kN
Lysaght 406	0.4
Lysaght 700	0.87
Fielders 700	0.43

Panel 'L' 1970



WIND REGION	A							
qu (K Pa)	0.65	0.80	0.75	0.84	0.84	1.02	0.90	1.10
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30
KlipLok 406	560	460	490	430	430	360	410	330
KlipLok 700	1230	1000	1070	950	950	780	890	720
KingKlip 700	610	490	520	470	470	380	440	360
Force (kN/m)	0.70	0.87	0.81	0.91	0.91	1.11	0.98	1.19

WIND REGION	B							
qu (K Pa)	0.83	1.09	0.96	1.26	1.06	1.40	1.14	1.50
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30
KlipLok 406	440	330	380	290	340	260	320	240



KlipLok 700	960	730	830	630	750	570	700	530
KingKlip 700	470	360	410	310	370	280	340	260
Force (kN/m)	0.90	1.18	1.04	1.37	1.15	1.52	1.24	1.63

WIND REGION	C							
qu (K Pa)	1.27	2.19	1.47	2.31	1.63	2.57	1.75	2.75
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤ 30	≤ 15	≤ 30	≤ 15	≤ 30	≤ 15	≤ 30
KlipLok 406	290	160	250	150	220	M/A	210	N/A
KlipLok 700	630	360	540	340	490	310	450	290
KingKlip 700	310	180	260	170	240	150	220	N/A
Force (kN/m)	1.38	2.37	1.59	2.50	1.77	2.78	1.90	2.98

1. Roof Interface bracket spacing in the above table for panel length of 1.97 m.
2. The table prepared based on GD Rail capacity and Klip-Lok bracket pull-out capacity
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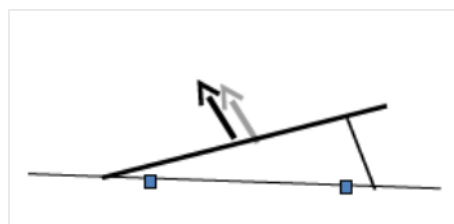
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Roof Interface Bracket Spacing (mm) Across for PV – Tripod and Adjustable Tilting System  
fixing on purlin on the Roofing sheet  
Two Klip-Lok per frame

### Design Data

KlipLok Type	Capacity kN
Lysaght 406	1.37
Lysaght 700	1.17
Fielders 700	0.5

Panel 'L' 1970





WIND REGION	A							
qu (K Pa)	0.65	0.80	0.75	0.84	0.84	1.02	0.90	1.10
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30
KlipLok 406	1510	1440	1460	1430	1430	1350	1400	1140
KlipLok 700	1510	1440	1460	1430	1430	1050	1200	980
KingKlip 700	700	570	610	540	540	450	510	410
Force (kN/m)	0.70	0.87	0.81	0.91	0.91	1.11	0.98	1.19

WIND REGION	B							
qu (K Pa)	0.83	1.09	0.96	1.26	1.06	1.40	1.14	1.50
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30
KlipLok 406	1430	1350	1400	1000	1360	900	1340	840
KlipLok 700	1430	1200	1120	850	1010	770	940	710
KingKlip 700	550	420	480	360	430	320	400	300
Force (kN/m)	0.90	1.18	1.04	1.37	1.15	1.52	1.24	1.63

WIND REGION	C							
qu (K Pa)	1.27	2.19	1.47	2.31	1.63	2.57	1.75	2.75
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30	≤ 15	≤30
KlipLok 406	990	570	860	540	770	490	720	450
KlipLok 700	850	490	730	460	660	420	610	390
KingKlip 700	360	210	310	190	280	170	260	160
Force (kN/m)	1.38	2.37	1.59	2.50	1.77	2.78	1.90	2.98

1. Roof Interface bracket spacing in the above table for panel length of 1.97 m.
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9. For panels ranging in length 1700 to 1800mm increase spacings by 11.5%
10. For panels ranging in length 1880 to 1970mm adopt tabulated spacings



### **Warranty**

Xiamen Grace Solar Technology Co., Ltd. warrants that its Grace Solar Panel Mounting System is free from defects in materials and workmanship for a period of 10 years from the date on which the Frame is purchased from Grace Solar, on the terms set out in this warranty.

In the event that the Frame does not conform to this warranty during the Warranty Period, Grace Solar will, at its option, either repair or replace the Frame or pay the cost of having the Frame repaired or replaced. To the extent permitted by law, Grace Solar's total liability under this warranty will in no circumstances exceed the repair or replacement of the Frame or payment of the cost of having the Frame repaired or replaced. In the event of replacement of the Frame, any remaining part of the Warranty Period will be transferred to the replacement Frame.

This warranty will not apply to any defect or damage to the Frame arising directly or indirectly from:

1. Shipment or storage of the Frame;
2. Improper installation, maintenance, repair or use of the Frame;
3. Normal wear and tear;
4. Misuse, neglect, abuse, accidental damage or modification to the Frame;
5. Failure to observe the instructions set out in the System Manual; or
6. Power failure, power surges, lightning, fire, explosion, flood, extreme weather conditions, environmental disasters or other causes outside Grace Solar's control, as determined by Grace Solar in its sole discretion.

This warranty does not cover, and under no circumstances will Grace Solar be liable for, any costs associated with the removal, shipping, handling or re-installation of the Frame or the costs of sending personnel to any site to repair or replace the Frame.

This warranty is only provided to the original purchaser of the Grace Solar panels mounting system (Purchaser) or, where the Purchaser is an installer or builder who on-supplies the Frame to another party, to that other party (End-User). This warranty is not transferable.

Where an End-User wants make a claim under this warranty, the End-User must in the first instance contact the installer or builder from whom the Frame was purchased.

This warranty will not apply to any claims received by Grace Solar after the expiration of the Warranty Period. Grace Solar makes no warranties, express or implied, other than the warranties made herein, and specifically disclaim all other warranties, representations and conditions to the extent permitted by law. To the extent permitted by law, in no circumstances will Grace Solar be liable for direct, indirect, special or consequential damages arising from a defective Frame or for any damage or injury to persons or property. Grace Solar's aggregate liability, if any, in damages or otherwise, will not exceed the invoice value of the Frame at the time of purchase from Grace Solar.

Any provision contained in this warranty which is prohibited or unenforceable in any jurisdiction will be deemed to be ineffective to the extent of such prohibition or unenforceability and will not invalidate the remaining provisions nor affect the validity or enforceability of that provision in any other jurisdiction.



# END OF DOCUMENT