

Our Ref: 20935

December 2018

Mortec Industries
2/43 Lara Way
Campbellfield, VIC, 3061

Mortec Klip-Lok Type Clamp PV Mounting System for use within Australia

Dome Consulting (Aust) Pty Ltd have carried out a structural design check of the Mortec Industries Klip-Lok type clamp System for use in Australia. The design check has been based on the information provided by Mortec Industries

Australian Standards

AS 1170. 2011 – Structural Design Actions

Part 0 – General Principles

Part 1 – Permanent imposed and other actions

Part 2 – Wind Actions

Part 3 – Snow and Ice Actions

AS 1664.1 – Aluminium structures - Limit state design

Following design criteria has been used for the structural verification

Wind Region A, B, C, D

Wind Terrain Category 2 & 3

Wind average recurrence interval of 100 years

Maximum Building height 20 m

Max. Solar Panel length 1650mm (for larger panel, refer to notes)

The design and documentation has determined that all supporting componentry in the above mentioned documentation was found to be acceptable.

Refer to attached summary table for interface spacing.

Construction is to be carried out strictly in accordance with the manufacturers instructions. This work was designed in accordance with the provisions of Australian Building Regulations and in accordance with sound, widely accepted engineering principles

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Structural Design Summary Table

KLIP-LOC TYPE CLAMP ACCREDITATION

For

Adjustable Triangle, Adjustable Tilt Legs and Direct Mounting
in accordance to AS1170.2 2011 Amdt 5 - June 2017

Terrain Category 3

Direct Mounting or using L-feet and rails - Anywhere on the roof

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

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

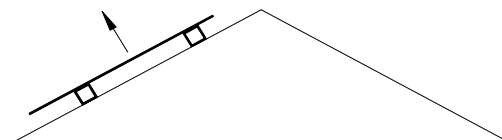
Fixing anywhere on the Roofing sheet

Two Klip-Lok per frame

Design Data

KlipLok Type	Capacity kN
Lysaght 406	0.40
Lysaght 700	0.87
Longline 305	1.68
Stramit SDU	0.73
Fielders 700	0.43

Panel 'L' 1650



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	670	545	580	515	515	420	485	390
KlipLok 700	1440	1185	1270	1125	1125	925	1060	860
KingKlip 700	715	580	620	555	555	455	515	420
Stramit SDU	1225	995	1060	945	945	775	890	725
Longline 305	1515	1435	1515	1435	1460	1385	1420	1350
Force (kN/m)	0.59	0.73	0.68	0.76	0.76	0.93	0.82	1.00

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	525	390	445	340	410	305	380	285
KlipLok 700	1135	865	990	750	895	675	830	630
KingKlip 700	560	430	485	370	435	330	410	305
Stramit SDU	955	725	830	630	745	560	695	525
Longline 305	1395	1325	1395	1325	1350	1230	1310	1105
Force (kN/m)	0.75	0.99	0.87	1.14	0.96	1.27	1.03	1.36

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	340	190	295	180	265	160	245	150
KlipLok 700	745	430	640	410	580	360	535	340
KingKlip 700	360	210	315	200	285	180	265	160
Stramit SDU	620	360	535	340	485	305	445	285
Longline 305	1165	945	1165	945	1010	820	905	735
Force (kN/m)	1.15	1.99	1.33	2.10	1.48	2.33	1.59	2.50

1. Roof Interface bracket spacing in the above table for panel length of 1.65 m.
2. The table prepared based on GD Rail capacity and Klip-Lok bracket pull-out capacity
3. The panels or L-Foot have to be fixed using 1-M8 bolt.
- 4 The above mentioned spacing table is for Roof Interface Bracket fixing including edge of the roof.
5. On purlin means that distance from the purlin to the Klip-Lok type bracket(centre to centre) is not more than 100mm
6. Angle refers to roof angle.
7. For panels lengths upto 1800mm reduce spacings by 12.0%
8. For panels lengths upto 2050mm reduce spacings by 22.0%
9. Spacing applies to roofs with pitch <=10 degrees

Direct Mounting or using L-feet and rails - On top of the purlin

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

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

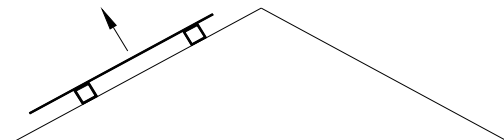
Fixing on purlin on the Roofing sheet

Two Klip-Lok per frame

Design Data

KlipLok Type	Capacity kN
Lysaght 406	1.37
Lysaght 700	1.17
Longline 305	1.76
Stramit SDU	1.80
Fielders 700	0.50

Panel 'L' 1650



WIND REGION	A							
qu (K Pa)	0.65	0.8	0.75	0.84	0.84	1.02	0.9	1.1
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤ 30	≤ 15	≤ 30	≤ 15	≤ 30	≤ 15	≤ 30
KlipLok 406	1440	1380	1395	1365	1365	1305	1345	1285
KlipLok 700	1440	1380	1395	1365	1365	1240	1345	1165
KingKlip 700	840	675	725	650	650	525	600	495
Stramit SDU	1440	1380	1395	1365	1365	1305	1345	1285
Longline 305	1515	1435	1515	1435	1460	1385	1420	1350
Force (kN/m)	0.59	0.73	0.68	0.76	0.76	0.93	0.82	1.00

WIND REGION	B							
qu (K Pa)	0.83	1.09	0.96	1.26	1.06	1.4	1.14	1.5
hz	5 m		10 m		15 m		20 m	
Angle	≤ 15	≤ 30	≤ 15	≤ 30	≤ 15	≤ 30	≤ 15	≤ 30
KlipLok 406	1365	1285	1320	1185	1290	1060	1270	990
KlipLok 700	1365	1165	1320	1010	1200	905	1115	850
KingKlip 700	645	495	560	430	515	380	475	360
Stramit SDU	1365	1285	1320	1245	1290	1215	1270	1195
Longline 305	1395	1325	1395	1325	1350	1280	1310	1165
Force (kN/m)	0.75	0.99	0.87	1.14	0.96	1.27	1.03	1.36

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	1175	675	1010	640	915	570	850	535
KlipLok 700	1000	580	865	540	780	495	725	455
KingKlip 700	430	245	370	225	330	210	305	190
Stramit SDU	1240	895	1200	850	1170	760	1115	705
Longline 305	1220	990	1220	990	1060	860	945	770
Force (kN/m)	1.15	1.99	1.33	2.10	1.48	2.33	1.59	2.50

1. Roof Interface bracket spacing in the above table for panel length of 1.65 m.
2. The table prepared based on GD Rail capacity and Klip-Lok bracket pull-out capacity
3. The panels or L-Foot have to be fixed using 1-M8 bolt.
- 4 The above mentioned spacing table is for Roof Interface Bracket fixing including edge of the roof.
5. On purlin means that distance from the purlin to the Klip-Lok type bracket(centre to centre) is not more than 100mm
6. Angle refers to roof angle.
7. For panels lengths upto 1800mm reduce spacings by 12.0%
8. For panels lengths upto 2050mm reduce spacings by 22.0%
9. Spacing applies to roofs with pitch <=10 degrees

Single Tripod and Adjustable Tilting System - Anywhere on the roof

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	0.40
Lysaght 700	0.87
Longline 305	1.68
Stramit SDU	0.73
Fielders 700	0.43

Panel 'L' 1650



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	670	545	580	515	515	420	390	315
KlipLok 700	1440	1185	1270	1125	1125	925	850	685
KingKlip 700	715	580	620	555	555	455	420	340
Stramit SDU	1225	995	1060	945	945	775	715	580
Longline 305	1515	1435	1515	1435	1460	1385	1420	1350
Force (kN/m)	0.59	0.73	0.68	0.76	0.76	0.93	0.82	1.00

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	525	390	445	340	410	305	380	285
KlipLok 700	1135	865	990	750	895	675	830	630
KingKlip 700	560	430	485	370	435	330	410	305
Stramit SDU	955	725	830	630	745	560	695	525
Longline 305	1395	1325	1395	1325	1350	1240	1310	1115
Force (kN/m)	0.75	0.99	0.87	1.14	0.96	1.27	1.03	1.36

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	340	190	295	180	265	160	245	150
KlipLok 700	745	430	640	410	580	360	535	340
KingKlip 700	360	210	315	200	285	180	265	160
Stramit SDU	620	360	535	340	485	305	445	285
Longline 305	1240	905	1240	905	1075	790	965	705
Force (kN/m)	1.15	1.99	1.33	2.10	1.48	2.33	1.59	2.50

1. Roof Interface bracket spacing in the above table for panel length of 1.65 m.
2. The table prepared based on GD Rail capacity and Klip-Lok bracket pull-out capacity
3. The panels or L-Foot have to be fixed using 1-M8 bolt.
- 4 The above mentioned spacing table is for Roof Interface Bracket fixing including edge of the roof.
5. On purlin means that distance from the purlin to the Klip-Lok type bracket(centre to centre) is not more than 100mm
6. Angle refers to tilt angle between roof and panels – not to horizontal.
7. For panels lengths upto 1800mm reduce spacings by 12.0%
8. For panels lengths upto 2050mm reduce spacings by 22.0%
9. Spacing applies to roofs with pitch <=10 degrees

A2

D6 SOLAR PANELS

The use of this Paragraph (D6) shall be limited to the calculation of wind loads on solar panels with the following restrictions:

- (a) Panels attached to enclosed buildings with aspect ratios $h/d \leq 0.5$ and $h/b \leq 0.5$.
- (b) Panels be attached parallel to the roof plane.
- (c) Panels with a gap of between 50 mm and 300 mm between the underside of the panel and the roof(s) (no pitched frames).
- (d) Panels with a minimum distance between panel and roof edge of $2s$ where s is the gap between the underside of the panel and the roof surface, as shown in Figure D8 (roof edge includes ridges with pitch $\geq 10^\circ$).

The aerodynamic shape factor (C_{fig}) for calculating net pressures for solar panels satisfying the above conditions, as shown in Figure D8, is given in Table D11. The aerodynamic shape factor (C_{fig}) contains local pressure and area reduction effects for calculating net loads on individual panels installed as part of an array of panels in the areas of the roof identified in Figure D9.

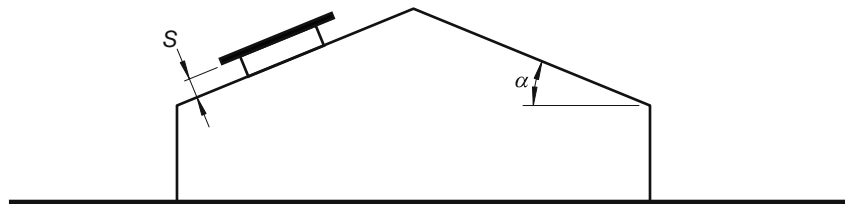


FIGURE D8 PANEL MOUNTED PARALLEL TO ROOF PLANE

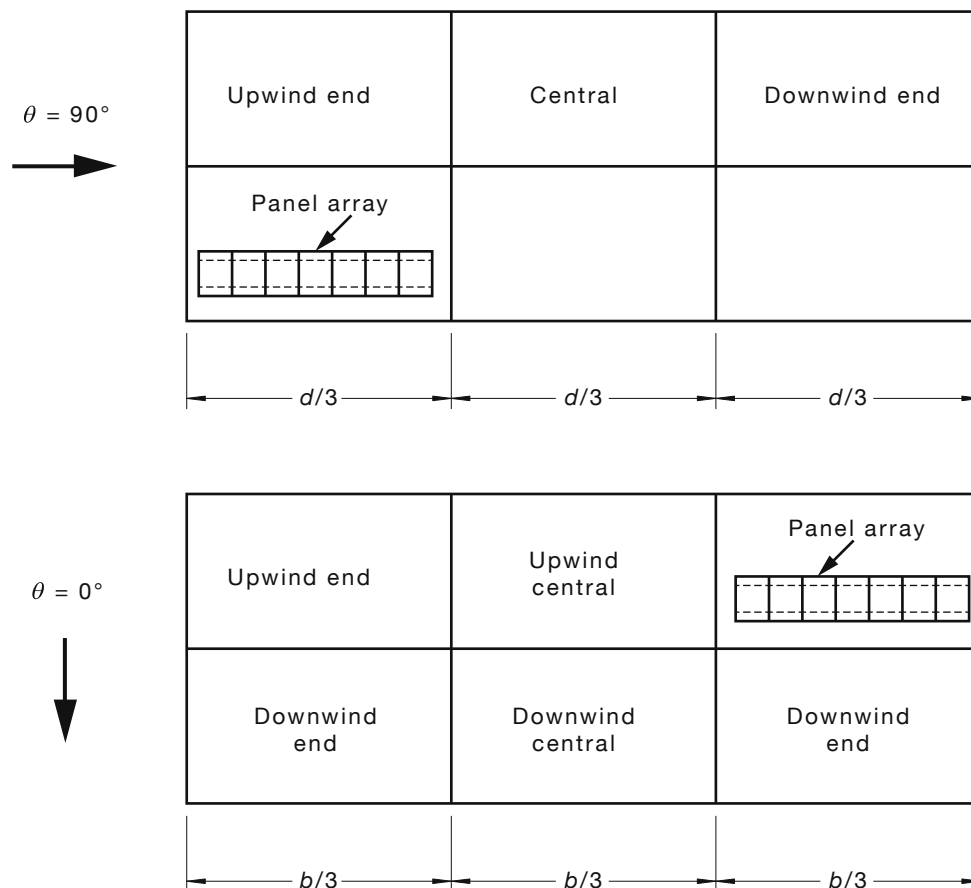


FIGURE D9 ROOF ZONES FOR PANEL ARRAY