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Our Ref: 2967/K.Z

13 April 2017

Clenergy Australia  
Suite 1, 10 Duerdin St  
Clayton, VIC 3168  
Australia



### **PV Array Frame Engineering Certification**

#### **Installation of Clenergy PV-ezRack Flush Mount Solar System on Lysaght KlipLok 406 with ER-R-ECO Rails**

Gamcorp (Melbourne) Pty Ltd, being Structural Engineers within the meaning of Australian Building Regulations, have carried out a structural design check of Clenergy PV-ezRack Flush Mount Solar System installation on Lysaght KlipLok 406 within Australia. The design check is based on the information and test reports provided by Clenergy Australia.

We find the Installation of Clenergy PV-ezRack Flush Mount Solar System on KlipLok 406 for Australian use to be structurally sufficient based on the following conditions:

- Wind loads to AS/NZ1170.2:2011 Admt 3:2013
- Wind region A, B, C, D
- Wind terrain category 1.5, 2, 2.5 & 3
- Wind average recurrence interval of 200 years
- Maximum building height 20m
- The maximum assessed PV panel dimensions are 1670mm x 1000mm and 2000mm x 1000mm
- Maximum weight of the PV panel and array frame to be 15 kg/m<sup>2</sup>
- Rails to be ER-R-ECO
- The roof interface to be ER-I-32 roof clamp as per test report MT-17/001-A
- The spacings are determined based on the test on C15012 roof purlins at 1600mm centres
- The spacings are applicable only when the clamps are installed on the full roof sheeting ribs; Do not install on the overlapped ribs
- Each PV panel to be installed using 2 rails minimum in all circumstances
- Installation of PV array to be done in accordance with the PV installation manual
- The certification **excludes** assessment of roof structure and PV panels

***Refer to attached summary table for interface spacing***



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**NOTES:**

- **The recommended spacing nominated in this certification is based on the capacity of the array frame, not the roof structure and PV panel. It is the responsibility of the installer to adopt the most critical spacing.**
- **If any of the above conditions cannot be met, the structural engineer must be notified immediately.**

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.

Yours faithfully,  
Gamcorp (Melbourne) Pty Ltd

A handwritten signature in blue ink, appearing to read 'Martin Gamble'.

Martin Gamble  
Managing Director  
MAICD

Kevin Zhang  
Structural Engineer  
M.Eng Structural Engineering



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## Structural Design Documentation

# **PV-ezRack Flush Mount System on Lysaght KlipLok 406 Interface Spacing Table According to AS/NZS 1170.2-2011 Amdt 3-2013 with ER-R-ECO Rails within Australia Terrain Category 1.5, 2, 2.5 & 3**

For: Clenergy Australia

Job Number: 2967  
Date: 13 April 2017



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ISO 9001:2008 Registered Firm  
Certificate No: AU1222

**Job No: 2967**

**Client: Clenergy Australia**

**Project: Flush Mount Interface Spacing Table for Lysaght KlipLok 40**

**Address: within Australia**

**Australian Standards**

AS/NZS 1170. 2011 – Structural Design Actions

Part 0 – General Principles

Part 1 – Permanent imposed and other actions

Part 2 – Wind Actions

AS/NZS 1252 – High Strength Structural Bolting

AS 4055 – Wind Loads for Housing

AS/NZS 1664 – Aluminium Structures

AS 4100 – Steel Structures

AS/NZS 4600 – Cold-Formed Steel Structures

**Wind Terrain Category:**

WTC 1.5, 2, 2.5 & 3

**Designed: K.Z**

**Date: Apr-17**

Client: **Clenergy Australia**  
 Project: **Flush Mount Interface Spacing Table for Lysaght KlipLok 406**  
 Address: **within Australia**  
 Designed: **K.Z**

Job: **2967**  
 Date: **Apr-17**

Checked:

**Flush Mount Interface Spacing Table for Lysaght KlipLok 406**

Type of Rail ER-R-ECO  
 Type of Interface ER-I-32  
 Solar Panel Dimension 1.67m x 1.0m  
**Terrain category 1.5**

Roof Angle ( $\Phi$ ) -  $0^\circ \leq \Phi < 5^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central		
A	823	1014	753	927	712	875		
B	551	676	505	619	478	585		
C	358	437	328	401	311	379		
D	232	282	213	259	201	245		

Roof Angle ( $\Phi$ ) -  $5^\circ \leq \Phi \leq 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central		
A	823	1200	753	1096	712	1034		
B	551	796	505	728	478	688		
C	358	513	328	470	311	445		
D	232	331	213	304	201	287		

D.W & U.W - Downwind and Upwind refer to note 3.

Client: **Clenergy Australia**  
 Project: **Flush Mount Interface Spacing Table for Lysaght KlipLok 406**  
 Address: **within Australia**  
 Designed: **K.Z**

Job: **2967**  
 Date: **Apr-17**

Checked:

Roof Angle ( $\Phi$ ) -  $30^\circ < \Phi \leq 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal
A	1331	1860	1230	1740	1159	1666		
B	891	1360	815	1265	770	1192		
C	573	880	525	805	496	760		
D	368	561	338	515	320	487		

D.W & U.W - Downwind and Upwind refer to note 3.

Client: **Clenergy Australia**  
 Project: **Flush Mount Interface Spacing Table for Lysaght KlipLok 406**  
 Address: **within Australia**  
 Designed: **K.Z**

Job: **2967**  
 Date: **Apr-17**

Checked:

**Flush Mount Interface Spacing Table for Lysaght KlipLok 406**

Type of Rail ER-R-ECO  
 Type of Interface ER-I-32  
 Solar Panel Dimension 1.67m x 1.0m  
**Terrain category 2**

Roof Angle ( $\Phi$ ) -  $0^\circ \leq \Phi < 5^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central		
A	933	1152	840	1035	791	974		
B	623	764	562	689	530	650		
C	403	493	365	446	344	420		
D	261	318	236	288	223	272		

Roof Angle ( $\Phi$ ) -  $5^\circ \leq \Phi \leq 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central		
A	933	1365	840	1225	791	1152		
B	623	901	562	812	530	765		
C	403	579	365	523	344	493		
D	261	373	236	337	223	318		

D.W & U.W - Downwind and Upwind refer to note 3.

Client: **Clenergy Australia**  
 Project: **Flush Mount Interface Spacing Table for Lysaght KlipLok 406**  
 Address: **within Australia**  
 Designed: **K.Z**

Job: **2967**  
 Date: **Apr-17**

Checked:

Roof Angle ( $\Phi$ ) -  $30^\circ < \Phi \leq 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal
A	1469	1928	1353	1880	1289	1805		
B	1010	1500	909	1382	856	1317		
C	647	997	584	898	551	845		
D	416	634	376	573	355	540		

D.W & U.W - Downwind and Upwind refer to note 3.



Client: **Clenergy Australia**  
 Project: **Flush Mount Interface Spacing Table for Lysaght KlipLok 406**  
 Address: **within Australia**  
 Designed: **K.Z**

Job: **2967**  
 Date: **Apr-17**

Checked:

**Flush Mount Interface Spacing Table for Lysaght KlipLok 406**

Type of Rail ER-R-ECO  
 Type of Interface ER-I-32  
 Solar Panel Dimension 1.67m x 1.0m  
**Terrain category 2.5**

Roof Angle ( $\Phi$ ) -  $0^\circ \leq \Phi < 5^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central		
A	1118	1384	996	1231	913	1127		
B	743	914	664	816	610	748		
C	479	587	430	526	395	483		
D	309	378	278	339	256	312		

Roof Angle ( $\Phi$ ) -  $5^\circ \leq \Phi \leq 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central		
A	1118	1647	996	1461	913	1335		
B	743	1079	664	962	610	882		
C	479	691	430	618	395	567		
D	309	443	278	397	256	365		

D.W & U.W - Downwind and Upwind refer to note 3.

Client: **Clenergy Australia**  
 Project: **Flush Mount Interface Spacing Table for Lysaght KlipLok 406**  
 Address: **within Australia**  
 Designed: **K.Z**

Job: **2967**  
 Date: **Apr-17**

Checked:

Roof Angle ( $\Phi$ ) -  $30^\circ < \Phi \leq 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal
A	1686	2011	1545	1959	1444	1919		
B	1211	1721	1079	1578	988	1476		
C	772	1196	690	1066	634	976		
D	494	757	443	676	407	621		

D.W & U.W - Downwind and Upwind refer to note 3.

Client: **Clenergy Australia**  
 Project: **Flush Mount Interface Spacing Table for Lysaght KlipLok 406**  
 Address: **within Australia**  
 Designed: **K.Z**

Job: **2967**  
 Date: **Apr-17**

Checked:

**Flush Mount Interface Spacing Table for Lysaght KlipLok 406**

Type of Rail ER-R-ECO  
 Type of Interface ER-I-32  
 Solar Panel Dimension 1.67m x 1.0m  
**Terrain category 3**

Roof Angle ( $\Phi$ ) -  $0^\circ \leq \Phi < 5^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central		
A	1403	1747	1202	1491	1066	1320		
B	925	1142	797	981	709	872		
C	594	729	514	629	458	561		
D	382	467	331	404	296	361		

Roof Angle ( $\Phi$ ) -  $5^\circ \leq \Phi \leq 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central		
A	1403	1987	1202	1776	1066	1568		
B	925	1354	797	1161	709	1030		
C	594	860	514	741	458	660		
D	382	549	331	474	296	424		

D.W & U.W - Downwind and Upwind refer to note 3.

Client: **Clenergy Australia**  
 Project: **Flush Mount Interface Spacing Table for Lysaght KlipLok 406**  
 Address: **within Australia**  
 Designed: **K.Z**

Job: **2967**  
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Checked:

Roof Angle ( $\Phi$ ) -  $30^\circ < \Phi \leq 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Intermediate	Internal		Intermediate	Internal		Intermediate	Internal
A	1912	2114		1779	2044		1628	1990
B	1460	2026		1297	1815		1156	1662
C	963	1446		829	1284		738	1141
D	613	943		529	812		472	723

D.W & U.W - Downwind and Upwind refer to note 3.

Client: **Clenergy Australia**  
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 Address: **within Australia**  
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Checked:

**General Notes**

Note 1 Following components are satisfied to use according to AS/NZS 1170.2-2011 Amdt 3-2013

Components	Part Number	Description
ECO Rails	ER-R-ECO	
Roof Clamps	ER-I-32	as per test report MT-17/001-A

Note 2 Terrain category 2 (TC2) refers to open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5 m to 5 m, with no more than two obstruction per obstructions per hectare.

Terrain category 3(TC3) refers to numerous closely spaced obstructions having heights generally from 3 m to 10 m. For example suburban housing or light industrial estates. Refer clause 4.2.1 of AS/NZS 1170.2-2011 Amdt 3-2013 for definition of Terrain category 3.

Note 3 Refer to Gamcorp Roof Definition and Figure D9 of AS/NZS 1170.2:2011 Amdt 2-2012 for definition of roof zones.

Note 4 The above tables apply when the maximum purlin spacing is 1600mm and the maximum roof sheeting deflection is L/120.

Note 5 The spacings need to be reduced by 17% when using 2000mm x 1000mm panels.

Note 6 Roof clamps to be located on full roof sheeting ribs only. Do not install on overlapped ribs.