



12 May 2020

Clenergy Australia  
1/10 Duerdin Street  
Clayton, VIC 3168

## CERTIFICATION LETTER

Clenergy PV ez-Rack Solar Roof Certification – TC2, 2.5, 3 – Wind Region A, B, C, D. Internal REF:  
**00115**. Project REF: **CL-10088-SM-REV-E**.

MW Engineering Melbourne, being Structural Engineers within the meaning of Australian regulations, have calculated the maximum spacings for the PV ez-Rack rail system for the following conditions:

- **Wind Loads to AS 1170.2-2011 AMDT 4-2016**
  - o **Wind Terrain Category 2, 2.5 and 3**
  - o **Wind average recurrence of 200 years**
  - o **Wind Region A, B, C, D**
- **Solar panel length up to 2.2m**
- **Solar panel width up to 1.1m**

Attached are the tables showing the spacings according to Wind Region, roof pitch, and building height.

The values shown on these tables will be valid unless an amendment is issued on any of the following codes:

- |  |                                |
|--|--------------------------------|
| - <b>AS/NZS 1170.0- 2002 AMDT 4-2016</b> | <b>General Principles</b>      |
| - <b>AS/NZS 1170.1- 2002 AMDT 4-2016</b> | <b>Imposed Loadings</b>        |
| - <b>AS/NZS 1170.2- 2011 AMDT 4-2016</b> | <b>Wind Loadings</b>           |
| - <b>AS/NZS 1664.1- 1997 AMDT 1:1999</b> | <b>Aluminium Code</b>          |
| - <b>AS 1684.2- 2010 AMDT 2-2013</b>     | <b>Residential Timber Code</b> |
| - <b>AS 1720.1- 2010 AMDT 3-2015</b>     | <b>Timber Code</b>             |
| - <b>AS/NZS 4600: 2005</b>               | <b>Cold Formed Steel Code</b>  |
| - <b>AS 4100- 1998</b>                   | <b>Steel Structures</b>        |
| - <b>AS/NZS 1252.2-2016</b>              | <b>Bolting</b>                 |

Should you have any queries, do not hesitate to contact us.

Best Regards,

Alberto Escobar  
Civil/Structural Engineer

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## **STRUCTURAL DESIGN DOCUMENTATION**

# **PV-ezRack® SolarRoof Interface Spacing Table According to AS/NZS 1170.2:2011 Amdt 4-2016 Within Australia Terrain Category 2, 2.5 & 3**

**Client : Clenergy Australia**

**REF: CL-10088-SM-REV-E**

**Date: 12/05/2020**

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**Internal REF:** 00115  
**Client:** Clenergy Australia  
**Project:** PV ez-Rack SolarRoof Interface Spacing table

**Australian Standards**

<b>AS/NZS 1170.0:2002 (R2016)</b>	<b>General Principles</b>
<b>AS/NZS 1170.1:2002 (R2016)</b>	<b>Imposed loadings</b>
<b>AS/NZS 1170.2:2011 (R2016)</b>	<b>Wind Loadings</b>
<b>AS/NZS 1252.2:2016</b>	<b>Bolting</b>
<b>AS/NZS 4600: 2005</b>	<b>Cold-Formed Steel Structures</b>
<b>AS 4100-1998</b>	<b>Steel Structures</b>
<b>AS/NZS 1664.1:1997-Amdt 1:1999</b>	<b>Aluminium</b>
<b>AS 1684.2-2010/Amdt 2-2013</b>	<b>Residential Timber framing</b>
<b>AS 1720.1-2010/Amdt 3-2015</b>	<b>Timber design</b>

**Wind Terrain Category** 2, 2.5 and 3

**Designed:** SM

**Date:** May-20

**Disclaimer:** From the date of publication onwards, any amendment made to any of the above mentioned Standards will make this report outdated and a new one will have to be released, unless the amendment has no implications on this certificate.

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**PV ez-Rack SolarRoof Interface spacing Table for Tile Roof**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-01 (Tile Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	2

**Roof Angle -  $0^\circ < \alpha \leq 10^\circ$**

Wind Region	Building Height (m)				
	H ≤ 5	5 < H ≤ 10	10 < H ≤ 15	15 < H ≤ 20	20 < H ≤ 30
A	1488	1444	1369	1354	1310
B	1086	997	893	819	700
C	692	647	566	513	454
D	417	402	365	327	290

**Roof Angle -  $10^\circ < \alpha \leq 20^\circ$**

Wind Region	Building Height (m)				
	H ≤ 5	5 < H ≤ 10	10 < H ≤ 15	15 < H ≤ 20	20 < H ≤ 30
A	1459	1415	1342	1327	1284
B	1065	977	875	802	686
C	678	634	554	503	445
D	408	394	357	321	284

**Roof Angle -  $20^\circ < \alpha \leq 30^\circ$**

Wind Region	Building Height (m)				
	H ≤ 5	5 < H ≤ 10	10 < H ≤ 15	15 < H ≤ 20	20 < H ≤ 30
A	1444	1400	1328	1314	1270
B	1054	967	866	794	679
C	671	628	549	498	440
D	404	390	354	318	282

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

**Note:** This Engineering report is based on 2 m x 1 m panels and two rails per panel. Refer to Note 12 for further details.

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**PV ez-Rack SolarRoof Interface spacing Table for Tile Roof (Cont.)**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-01 (Tile Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	2

**Roof Angle -  $30^\circ < \alpha \leq 60^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1414	1371	1301	1287	1244
B	1032	947	848	778	665
C	657	615	537	488	431
D	396	382	346	311	276

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

**Note:** This Engineering report is based on 2 m x 1 m panels and two rails per panel. Refer to Note 12 for further details.

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**PV ez-Rack SolarRoof Interface spacing Table for Tile Roof**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-01 (Tile Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	2.5

**Roof Angle -  $0^\circ < \alpha \leq 10^\circ$**

Wind Region	Building Height (m)				
	H ≤ 5	5 < H ≤ 10	10 < H ≤ 15	15 < H ≤ 20	20 < H ≤ 30
A	1560	1514	1436	1420	1373
B	1139	1046	936	858	733
C	726	679	593	538	476
D	437	421	382	343	304

**Roof Angle -  $10^\circ < \alpha \leq 20^\circ$**

Wind Region	Building Height (m)				
	H ≤ 5	5 < H ≤ 10	10 < H ≤ 15	15 < H ≤ 20	20 < H ≤ 30
A	1529	1483	1407	1392	1346
B	1116	1025	918	841	719
C	711	665	581	528	466
D	428	413	375	336	298

**Roof Angle -  $20^\circ < \alpha \leq 30^\circ$**

Wind Region	Building Height (m)				
	H ≤ 5	5 < H ≤ 10	10 < H ≤ 15	15 < H ≤ 20	20 < H ≤ 30
A	1514	1468	1393	1377	1332
B	1105	1014	908	833	711
C	704	658	575	522	462
D	424	409	371	333	295

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

**Note:** This Engineering report is based on 2 m x 1 m panels and two rails per panel. Refer to Note 12 for further details.

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**PV ez-Rack SolarRoof Interface spacing Table for Tile Roof (Cont.)**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-01 (Tile Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	2.5

**Roof Angle -  $30^\circ < \alpha \leq 60^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1482	1438	1364	1349	1305
B	1082	993	889	815	697
C	689	645	563	511	452
D	415	400	363	326	289

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

**Note:** This Engineering report is based on 2 m x 1 m panels and two rails per panel. Refer to Note 12 for further details.

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**PV ez-Rack SolarRoof Interface spacing Table for Tile Roof**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-01 (Tile Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	3

**Roof Angle -  $0^\circ < \alpha \leq 10^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1665	1615	1532	1515	1465
B	1216	1116	999	916	783
C	774	724	633	575	508
D	466	450	408	366	325

**Roof Angle -  $10^\circ < \alpha \leq 20^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1632	1583	1501	1485	1436
B	1191	1093	979	898	767
C	759	710	620	563	498
D	457	441	400	359	318

**Roof Angle -  $20^\circ < \alpha \leq 30^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1615	1567	1486	1470	1422
B	1179	1082	969	888	759
C	751	703	614	557	493
D	452	436	396	355	315

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

**Note:** This Engineering report is based on 2 m x 1 m panels and two rails per panel. Refer to Note 12 for further details.



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**PV ez-Rack SolarRoof Interface spacing Table for Tile Roof (Cont.)**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-01 (Tile Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	3

**Roof Angle -  $30^\circ < \alpha \leq 60^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1582	1535	1455	1440	1392
B	1155	1060	949	870	744
C	736	688	601	546	483
D	443	427	388	348	308

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

**Note:** This Engineering report is based on 2 m x 1 m panels and two rails per panel. Refer to Note 12 for further details.

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**PV ez-Rack SolarRoof Interface spacing Table for Tin Roof**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	2
Purlin Thickness	1.5 mm

**Roof Angle -  $0^\circ < \alpha \leq 10^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1579	1496	1469	1432	1377
B	1368	1157	1047	964	900
C	890	734	670	624	588
D	542	506	431	395	367

**Roof Angle -  $10^\circ < \alpha \leq 20^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1574	1492	1460	1423	1372
B	1359	1157	1042	955	895
C	881	730	661	620	583
D	532	464	422	386	358

**Roof Angle -  $20^\circ < \alpha < 30^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1570	1487	1460	1418	1368
B	1359	1148	1037	950	890
C	877	725	661	620	583
D	532	464	422	386	353

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

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**PV ez-Rack SolarRoof Interface spacing Table for Tin Roof**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	2
Purlin Thickness	1.5 mm

**Roof Angle -  $30^\circ < \alpha < 60^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1561	1469	1423	1386	1359
B	1331	1102	1010	936	872
C	863	707	597	615	578
D	532	459	413	376	349

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

**Note:** This Engineering report is based on 2 m x 1 m panels and two rails per panel. Refer to Note 12 for further details.

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**PV ez-Rack SolarRoof Interface spacing Table for Tin Roof**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	2.5
Purlin Thickness	1.5 mm

**Roof Angle -  $0^\circ < \alpha \leq 10^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1671	1616	1561	1487	1469
B	1460	1359	1221	1111	1010
C	1001	890	789	725	652
D	624	569	505	459	422

**Roof Angle -  $10^\circ < \alpha \leq 20^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1666	1611	1551	1478	1460
B	1450	1359	1216	1106	1005
C	996	881	780	725	643
D	620	565	500	450	418

**Roof Angle -  $20^\circ < \alpha < 30^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1662	1607	1551	1473	1455
B	1450	1354	1212	1102	1001
C	987	877	776	721	643
D	620	565	496	454	413

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

**Note:** This Engineering report is based on 2 m x 1 m panels and two rails per panel. Refer to Note 12 for further details.

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**PV ez-Rack SolarRoof Interface spacing Table for Tin Roof**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	2.5
Purlin Thickness	1.5 mm

**Roof Angle -  $30^\circ < \alpha < 60^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1652	1561	1515	1469	1359
B	1395	1304	1193	1092	964
C	955	863	771	716	643
D	615	551	487	441	404

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

**Note:** This Engineering report is based on 2 m x 1 m panels and two rails per panel. Refer to Note 12 for further details.

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**PV ez-Rack SolarRoof Interface spacing Table for Tin Roof**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	3
Purlin Thickness	1.5 mm

**Roof Angle -  $0^\circ < \alpha \leq 10^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1744	1735	1671	1597	1450
B	1528	1524	1423	1285	1148
C	1102	1092	946	845	753
D	689	679	606	532	468

**Roof Angle -  $10^\circ < \alpha \leq 20^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1735	1726	1666	1588	1446
B	1524	1519	1418	1276	1138
C	1102	1088	936	840	748
D	684	670	601	523	464

**Roof Angle -  $20^\circ < \alpha < 30^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1680	1662	1597	1524	1377
B	1515	1423	1368	1248	1102
C	1203	1065	918	826	725
D	776	652	588	514	450

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

**Note:** This Engineering report is based on 2 m x 1 m panels and two rails per panel. Refer to Note 12 for further details.

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**PV ez-Rack SolarRoof Interface spacing Table for Tin Roof**

Type of Rail	ER-R-ECO and all other ECO - Rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Terrain Category	3
Purlin Thickness	1.5 mm

**Roof Angle -  $30^\circ < \alpha < 60^\circ$**

Wind Region	Building Height (m)				
	$H \leq 5$	$5 < H \leq 10$	$10 < H \leq 15$	$15 < H \leq 20$	$20 < H \leq 30$
A	1671	1662	1597	1524	1377
B	1441	1423	1368	1248	1102
C	1074	1065	918	826	725
D	661	652	588	514	450

**Note:** The above spacings are for Up Wind End and Down Wind End Zone. Increase 10% the above spacings to find out Central Zone spacings.

**Note:** This Engineering report is based on 2 m x 1 m panels and two rails per panel. Refer to Note 12 for further details.

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## General Notes

**Note 1** Tile Roof Interface Spacing tables based on a minimum depth into F7 (Pine) timber of 25mm and Tin Roof Interface Spacing tables based on a minimum depth into F7 (Pine) timber of 35mm.

**Note 2** Standard screws shipped for Tin and Tile Roof Interfaces

Metal Purlins/Battens	Fasteners to use
0.75 mm	Buildex- 14 - 11 x 70 Hex Head Zips Climaseal 3 with 16 mm ABW on G550 Steel Battens
1.5 mm - 2.4 mm	Buildex- 14 - 11 x 70 Hex Head Zips Climaseal 3 with 16 mm ABW
Wood Purlins and Rafters	Fasteners to be used
Timber F7 (Pine) and Timber 17 (Hardwood).	<p><b>Tin Interface:</b> Buildex- 14 - 11 x 70 Hex Head Zips Climaseal 3 with 16 mm ABW or 14g (6.3 mm)</p> <p><b>Tile Interface:</b> Buildex- 14 - 11 x 70 Hex Head Zips Climaseal 3 with 16 mm ABW or 14-10 x 65 Hex Head T17 with 16mm ABW Climaseal 3 or other screw of pullout value not less than screws above</p>

**Note 3** Tin and tile spacings were calculated based on Steel Purlins G450 1.5mm and Timber F7 (Pine). For 0.75 mm Steel Battens and 1.2mm purlins, all spacings shall be reduced as follows:

Wind Region A	Wind Region B	Wind Region C	Wind Region D
- 28 %	- 40 %	- 40 %	- 40 %

**Note 4** Tin Spacings were calculated based on Steel Purlins G450 1.5 mm. In case the purlin thickness is less than 1.5 mm, a site specific certificate shall be issued. Contact Clenergy for more information.

**Note 5** This engineering document was designed to cater for most common installation scenarios however, it does not cater for all of them. Contact Clenergy if you are unable to comply with any of the installation specifications listed on this document.

**Note 6** The following components are satisfied for use according to AS/NZS 1664.1:1997-Amdt 1:1999 and AS/NZS 1170.2:2011 Amdt 4-2016

Components	Part No.	Description
ECO-Rail	ER-R-ECO/XXXX	ECO Rail
Splice	ER-SP-ECO	PV-ezRack Splice for ECO rail
Australian Made Mill Finish ECO Rail	R-ECO/XXXX/AUMF	PV-ezRack Australian Made Mill Finish ECO Rail



## PV-ezRack Engineering Certificate

Components	Part No.	Description
ST-Rail	ER-R-STXXXX	Standard Rail
Splice	ER-SP-ST	PV-ezRack Splice for Standard Rail 200mm
Inter Clamp	ER-IC-STXX	Inter Clamp = clamp + Z-Module + Bolt.
End Clamp	ER-EC-STXX	End Clamp = clamp + Z-Module + bolt
Clamp	C-U/30/46-G	Universal Clamp for Frame Height 30-46mm with Grounding Clip
Clamp	C-U/30/46	Universal Clamp for Frame Height 30-46mm
End Clamp	ER-EC-DU35/40	End Clamp dual 35 or 40mm
End Clamp	ER-EC-DU40/46	End Clamp dual 40 or 46mm
Interface	ER-I-01, 02, 04, 23, 26 and 51	Tile Interface
Interface	ER-I-01/CS	Carbon Steel Tile Interface
Tile Interface with ezClick connection for ECO-Rail	ER-I-01/EZC/ECO	PV-ezRack SolarRoof, Tile Interface with ezClick connection for ECO-Rail
Interface	ER-I-05	Tin Interface
Interface	ER-I-05/BA	Tin Interface Black
Interface	ER-I-05/CM	Tin Interface with Click Module
Interface	ER-I-05A/EZC/ECO	ezClick connection for ECO-Rail
Interface	ER-I-25	Tin Interface with curved Base for corrugated Roof
End Clamp (*)	EC-FL/GE/XX/XX	End Clamp for Frameless Module (glued EPDM)
Inter Clamp (*)	IC-FL/GE/XX/XX	Inter Clamp for Frameless Module (glued EPDM)
End Clamp (*)	ER-EC-FL/XX/XX	End Clamp for Frameless Module

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Components	Part No.	Description
Inter Clamp (*)	ER-IC-FL/XX/XX	Inter Clamp for Frameless Module
Adapter for Corrugated Roof	EZ-AD-C43	Adapted for Corrugated Iron Roof for Tin interface ER-I-05
Corrugated Adapter	EZ-AD-C110	PV-ezRack Adapter for Corrugated Iron Roof.
Roof Extender ( <i>Reduction Factor</i> )	ER-RE-200	Roof Hook Extender, Suitable for ER-I-01,02,04,05,23,26, 51 and 01/CS
Connector Clamp	CRC-R/ECO	Cross Connector Clamp for ECO-Rail
Hanger Bolt	ER-HB-10/200A	PV-ezRack, Hanger Bolt M10*200mm
Hanger Bolt	ER-HB-MP/8/150EP	PV-ezRack Hanger Bolt for metal purlin M8*150mm
Hanger Bolt	ER-HB-8/150	Hanger bolt without mounting plate M8x150. Fixed to timber purlin only
ECO Rail Black	ER-R-ECO/XXXX/BA	ECO Rail Black
Splice ECO Rail Black	ER-SP-ECO/BA	Splice ECO Rail Black
Mid Clamp XX Black	ER-IC-STXXB	Inter Clamp XX Black
End Clamp XX Black	ER-EC-STXXB	End Clamp XX Black
ECO Rail Cap Black	CAP-ECO/PA/B	ECO Rail Cap Black
Black Universal Clamp	C-U/30/46-BA	Black Universal Clamp
Black Universal Clamp	C-U/30/46-G-BA	Black Universal Clamp with grounding clip

(\*) Subject to the panel manufacturer's installation guide.

- Note 7** For Terrain Category (TC) definition, please refer to clause 4.2.1 of AS/NZS 1170.2:2011 (R2016).
- Note 8** The installed frame must comply with the clamping zone of the PV Panel.
- Note 9** Capacities checked and compared against testing data from Clenergy Australia and MTS (NATA certified).

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- Note 10** Maximum permitted rail overhang of 40%.
- Note 11** For the definition of roof zones, refer to **Appendix D6** of the **AS/NZS 1170.2:2011 (R2016)** standard.
- Note 12** This Engineering report is based on 2 m x 1 m panels and two rails per panel. However, a percentage increase could be applied on all interface spacings as shown on the following table.

Number of rails per panel	Panel length / width (mm)	Spacing +/-
2 rails	≤ 1700/ ≤ 1100	+ 8 %
3 rails	≤ 1700/ ≤ 1100	+ 12 %
4 rails	≤ 1700 / ≤ 1100	+ 15 %
2 rails	≤ 2000/ ≤ 1100	0 %
3 rails	≤ 2000/ ≤ 1100	+ 10 %
4 rails	≤ 2000/ ≤ 1100	+ 12 %
2 rails	≤ 2100/ ≤ 1100	- 10 %
3 rails	≤ 2100/ ≤ 1100	+ 6 %
4 rails	≤ 2100/ ≤ 1100	+ 10 %
2 rails	≤ 2200/ ≤ 1100	- 13 %

- Note 13** From the date of publication onwards, any amendment made to any of the above mentioned Standards will make this report outdated and a new one will have to be released, unless the amendment has no implications on this certificate.
- Note 14** No consideration has been taken on the effect that the solar panel will have over the roof structure. It has been assumed that the roof will be able to resist the additional loadings imposed by the installation of the solar panels in conjunction with the Clenergy Mounting System.
- Note 15** All components from Clenergy must be installed according to manufacturer's specification and the instructions shown in the relevant installation manual. Please check the Clenergy Australia website or contact them for access to the most recent installation manuals.
- Note 16** No consideration has been taken on the effect of snow loads. In case the roof is located in a snow prone area, a special design must be made.
- Note 17** Neither Clenergy nor MW Engineering Melbourne are not to be responsible for external factors leading to compression of the tile interfaces.
- Note 18** Topographic Multiplier (Mt) was taken as 1.0.
- Note 19** Shielding Multiplier (Ms) was taken as 1.0.
- Note 20** Wind Direction Multiplier (Md) was taken as 1.0.

**Note 21 General conditions**

**Note 21.1 Minimum grade for steel purlins/battens of 450 Mpa.**

**Note 21.2 Timber Grade members: F7 (Pine) and F17 (Hardwood).**

**Note 21.3 If any of the screws of the interfaces go into pre-existing holes, they will have to be one size up compared to the screws that were previously installed. This is to ensure that the pullout capacity remains the same or higher.**

**Note 22 Spacings on Tile Interfaces will be reduced as follows:**

Interface	% of Reduction
ER-I-01/CS, ER-I-51 & ER-I-01/EZC/ECO	-
ER-I-02	-50%
ER-I-04	-50%
ER-I-23	-28%
ER-I-26	-28%

**Note 23 A minimum of two (2) screws per Tile Interface will be required for installation.**

**Note 24 For installations on the Central Zone increase ER-I-01 & ER-I-05 Interface Spacings by 10%.**

**Note 25 Use the same spacing listed on the tables of this certificate for panels installed in landscape.**

**Note 26 When using Roof Extender (ER-RE-200), reduce interface spacings by 15% on Wind Region A and B and 30% on Wind Region C and D.**

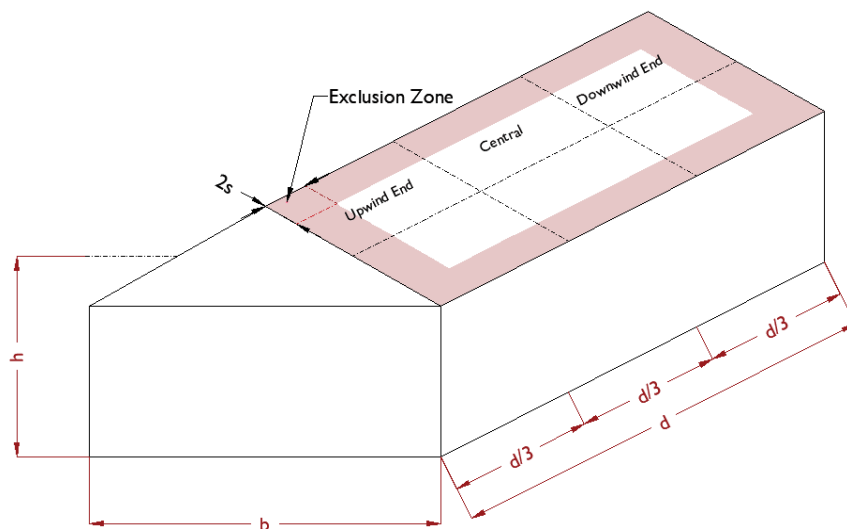
**Note 27 If reducing screw embedment by using EZ-AD-C43 adaptor or if attaching to a smaller timber batten/purlin, fixing spacing to be reduced/increased to timber purlins as per below:**

Batten type	Batten-Purlin Depth / Screw embedment	
	25 mm	30 mm
<b>Timber F7</b>	Reduction of 35%	Reduction of 25%
<b>Timber F17</b>	Spacings remain the same	Increase of 20%

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**Note 28** Conditions for flush mounted systems installed on flat and pitched roofs according to the D6 Appendix of the AS/NZS 1170.2:2011 (R2016).

- Roof pitch to be between 1° and 30°.
- $h/d \leq 0.5$  and  $h/b \leq 0.5$ . Being  $h$ = height,  $b$ = width and  $d$ = length of the building as per the below picture.
- Gap between the underside of the panel and the roof to be no less than 50mm and no more than 300mm.

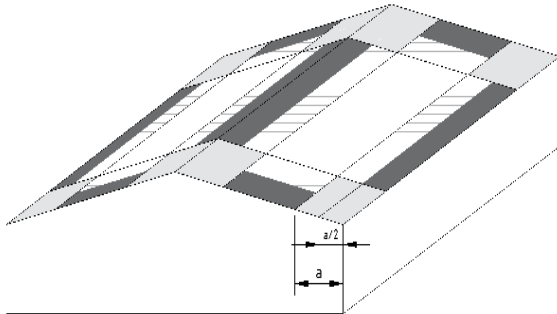


**Note 29** Exclusion zone for flush installation to be the minimum distance from the edge of the roof "2s", where "s" is the gap between the underside of the panel and the roof.

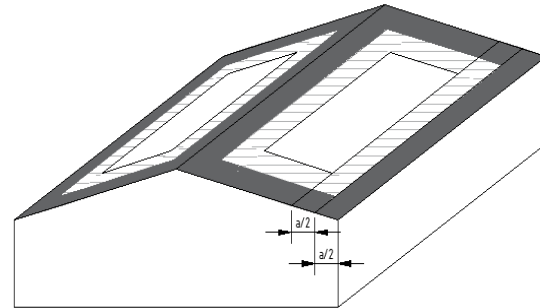
**Note 30** If the installation is located in ISO corrosivity category C4 reduce the interface spacing by 5%. If the installation is located in ISO corrosivity category C5 reduce the interface spacing by 25%.

**Note 31** Roof Zone definition for flush mounted systems installed on flat and pitched roofs when any of the conditions listed on Note 25 are not met.

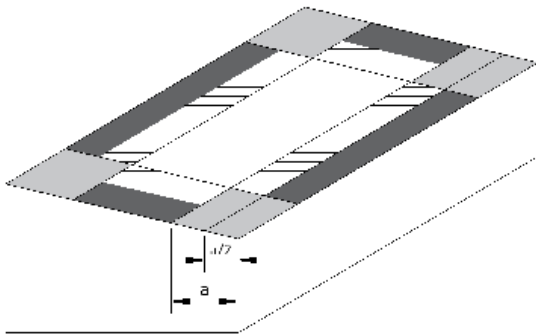
- Step 1** Determine building height ( $h$ ), width ( $b$ ) and length ( $d$ ).
- Step 2** Choose the **lowest** value between " $h$ ", " $b \times 0.2$ " and " $d \times 0.2$ ".
- Step 3** The **lowest** value on Step 2, equates to **a**.



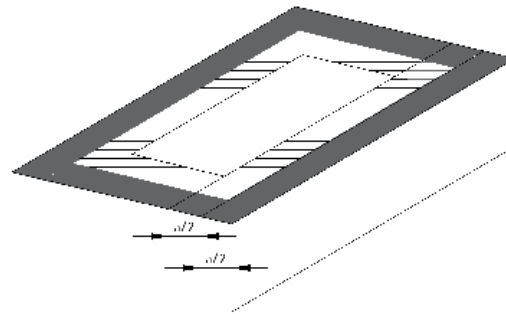
Roof Pitch  $< 10^\circ$



Roof Pitch  $\geq 10^\circ$







Flat/Mono – Slope Roof  $< 10^\circ$



Flat/Mono – Slope Roof  $\geq 10^\circ$

Legend:

-  Internal Zone
-  Intermediate Zone
-  Edge Zone
-  Corner Zone

**Note 32** Zone reduction factors to be the following:

**Internal:** Use the same spacings as central zone.

**Intermediate:** Divide central zone spacings by 1.5.

**Edge:** Divide central zone spacings by 2.

**Corner:** Divide central zone spacings by 3.

Example when building parameters fall outside section D6 of the AS/NZS 1170.2:2011 (R2016) standard.

Tin roof  
Wind Region A  
Terrain Category: 3  
Building height: 5m  
Roof pitch: less than 10°  
Panel dimension: 2 m x 1 m  
**Installation on intermediate zone to be:**  
Central spacing from the table above: 1918 mm  
Spacing calculated for intermediate zone: 1278 mm