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Our Ref: 2242/K.Z

12 September 2016

Xiamen Hopergy Photovoltaic Technology Co. Ltd.  
No.630, Tonghong Road  
Tongan District, Xiamen 361100  
China

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

#### **Installation of Hopergy Tile Roof Flush Mount Solar System with HOP-SLR03 Rails**

Gamcorp (Melbourne) Pty Ltd, being Structural Engineers within the meaning of Australian and New Zealand Building Regulations, have carried out a structural design check of Hopergy Tile Roof Flush Mount Solar System installation within Australia and New Zealand. The design check has been based on the information in the schematic drawings of the system components and test report provided by Hopergy Australia (IMSOLAR).

We find the Installation of Hopergy Tile Roof Flush Mount Solar System for Australian and New Zealand 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, W
- Wind terrain category 2 & 3
- Wind average recurrence interval of 500 years
- Maximum building height 20m
- The PV panel dimensions to be 1640mm x 992mm and 2000mm x 1000mm
- Maximum weight of the PV panel and array frame to be 15 kg/m<sup>2</sup>
- Rails to be HOP-SLR03
- Rails material to be aluminium graded AL6005-T5 or higher
- Tile roof interface to be #1 Tile Interface Bracket as per drawing HOP-TRH-1 and test report No.XMIN1603001560ML
- 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***

#### **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.**

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- **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 and New Zealand Building Regulations and in accordance with sound, widely accepted engineering principles.

Yours faithfully,  
Gamcorp (Melbourne) Pty Ltd



Martin Gamble  
Managing Director  
MAICD



Mudi Ariyaratna  
B.Eng(Civil)(Hons)Monash, M.Eng&Mgt, MIEAust,  
CPEng, NPER, RBP EC-39699, RPEQ- 15899



**gamcorp**

**Relationships built on trust**

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## Structural Design Documentation

**Tile Roof Flush Mount Racking System  
Interface Spacing Table  
According to AS/NZS 1170.2-2011 Amdt 3-2013  
with HOP-SLR03 Rails  
within Australia & New Zealand  
Terrain Category 2 & 3**

For: Xiamen Hopergy Photovoltaic  
Technology Co. Ltd.



Job Number: 2242  
Date: 12 September 2016

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ISO 9001:2008 Registered Firm  
Certificate No: AU1222

**Job No: 2242**

**Client: Xiamen Hopergy Photovoltaic Technology Co. Ltd.**

**Project: Flush Mount Interface Spacing Table for Tile Roof**

**Address: within Australia & New Zealand**

**Australian/New Zealand Standards**

AS/NZS 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/NZS 1252 – High Strength Structural Bolting

AS 4055 – Wind Loads for Housing

AS 4100 – Steel Structures

AS/NZS 4600 – Cold-Formed Steel Structures

**Wind Terrain Category:**

WTC 2 & 3

**Designed: K.Z**

**Date: Sep-16**

Client: **Xiamen Hopergy Photovoltaic Technology Co. Ltd.**  
 Project: **Flush Mount Interface Spacing Table for Tile Roof**  
 Address: **within Australia & New Zealand**  
 Designer **K.Z**

Job: **2242**  
 Date: **Sep-16**

Checked: **M.A**

**Flush Mount Interface Spacing Table for Tile Roof**

Type of Rail HOP-SLR03  
 Type of Interface #1 Tile Interface Bracket  
 Solar Panel Dimension 1.64m x 0.99m  
**Terrain category 2**

Roof Angle ( $\Phi$ ) - 5° - 10°

Wind Region	Building Height - H (m)							
	H≤10		10<H≤15		15<H≤20			
	D.W & U.W	Central		D.W & U.W	Central		D.W & U.W	Central
A	1300	1673		1169	1628		1100	1559
B	782	1099		706	989		665	931
C	517	721		467	651		441	614
D	320	443		289	401		273	378
W	991	1401		893	1259		841	1184

Roof Angle ( $\Phi$ ) - 11° - 20°

Wind Region	Building Height - H (m)							
	H≤10		10<H≤15		15<H≤20			
	D.W & U.W	Central		D.W & U.W	Central		D.W & U.W	Central
A	1001	1444		902	1297		849	1219
B	607	865		548	780		517	735
C	403	571		365	516		344	487
D	250	352		226	319		214	301
W	767	1098		692	989		652	931

D.W & U.W - Downwind and Upwind refer to note 6.

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 Address: **within Australia & New Zealand**  
 Designer: **K.Z**

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 Date: **Sep-16**

Checked: **M.A**

Roof Angle ( $\Phi$ ) – 21° - 30°

Wind Region	Building Height – H (m)							
	H≤10		10<H≤15		15<H≤20			
	D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central		
A	1084	1300	976	1169	919	1100		
B	656	782	592	706	558	665		
C	435	517	393	467	371	441		
D	270	320	244	289	230	273		
W	829	991	748	893	705	841		

Roof Angle ( $\Phi$ ) – 31° - 60°

Wind Region	Building Height – H (m)							
	H≤10		10<H≤15		15<H≤20			
	Intermedi ate	Internal	Intermedi ate	Internal	Intermedi ate	Internal		
A	1326	1682	1192	1649	1122	1630		
B	797	1232	719	1108	678	1043		
C	527	806	476	727	449	686		
D	326	495	295	447	278	422		
W	1011	1539	910	1413	857	1328		

D.W & U.W – Downwind and Upwind refer to note 6.

Client: **Xiamen Hopergy Photovoltaic Technology Co. Ltd.**  
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 Address: **within Australia & New Zealand**  
 Designer **K.Z**

Job: **2242**  
 Date: **Sep-16**

Checked: **M.A**

**Flush Mount Interface Spacing Table for Tile Roof**

Type of Rail HOP-SLR03  
 Type of Interface #1 Tile Interface Bracket  
 Solar Panel Dimension 1.64m x 0.99m  
**Terrain category 3**

Roof Angle ( $\Phi$ ) - 5° - 10°

Wind Region	Building Height - H (m)							
	H ≤ 10				10 < H ≤ 15			
	D.W & U.W	Central		D.W & U.W	Central		D.W & U.W	Central
A	1699	1866		1633	1790		1490	1734
B	1166	1627		1002	1418		892	1257
C	764	1073		660	924		588	822
D	469	653		406	565		363	504
W	1488	1733		1276	1665		1133	1608

Roof Angle ( $\Phi$ ) - 11° - 20°

Wind Region	Building Height - H (m)							
	H ≤ 10				10 < H ≤ 15			
	D.W & U.W	Central		D.W & U.W	Central		D.W & U.W	Central
A	1503	1747		1289	1678		1144	1627
B	899	1293		775	1111		691	987
C	593	845		513	729		458	650
D	366	518		317	448		284	400
W	1142	1626		982	1417		874	1256

D.W & U.W - Downwind and Upwind refer to note 6.

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Roof Angle ( $\Phi$ ) – 21° - 30°

Wind Region	Building Height - H (m)							
	H≤10		10<H≤15		15<H≤20			
	D.W & U.W	Central		D.W & U.W	Central		D.W & U.W	Central
A	1621	1699		1398	1633		1240	1490
B	973	1166		839	1002		747	892
C	641	764		554	660		494	588
D	395	469		342	406		306	363
W	1238	1488		1064	1276		946	1133

Roof Angle ( $\Phi$ ) – 31° - 60°

Wind Region	Building Height - H (m)							
	H≤10		10<H≤15		15<H≤20			
	Intermedi ate	Internal		Intermedi ate	Internal		Intermedi ate	Internal
A	1671	1810		1624	1762		1499	1725
B	1189	1648		1022	1553		909	1411
C	779	1203		672	1034		600	920
D	478	730		414	630		370	562
W	1497	1724		1302	1676		1155	1639

D.W & U.W – Downwind and Upwind refer to note 6.



Client: **Xiamen Hopergy Photovoltaic Technology Co. Ltd.**  
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 Address: **within Australia & New Zealand**  
 Designer **K.Z**

Job: **2242**  
 Date: **Sep-16**

Checked: **M.A**

**Flush Mount Interface Spacing Table for Tile Roof**

Type of Rail HOP-SLR03  
 Type of Interface #1 Tile Interface Bracket  
 Solar Panel Dimension 2m x 1m  
**Terrain category 2**

Roof Angle ( $\Phi$ ) - 5° - 10°

Wind Region	Building Height - H (m)							
	H≤10		10<H≤15		15<H≤20			
	D.W & U.W	Central		D.W & U.W	Central		D.W & U.W	Central
A	1066	1520		958	1362		902	1279
B	641	901		579	811		545	764
C	424	592		383	534		362	503
D	262	364		237	329		224	310
W	813	1149		732	1032		690	971

Roof Angle ( $\Phi$ ) - 11° - 20°

Wind Region	Building Height - H (m)							
	H≤10		10<H≤15		15<H≤20			
	D.W & U.W	Central		D.W & U.W	Central		D.W & U.W	Central
A	821	1184		739	1063		696	1000
B	498	709		450	640		424	603
C	331	468		299	423		282	399
D	205	289		186	262		175	247
W	629	901		567	811		535	763

D.W & U.W - Downwind and Upwind refer to note 6.

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 Address: **within Australia & New Zealand**  
 Designer: **K.Z**

Job: **2242**  
 Date: **Sep-16**

Checked: **M.A**

Roof Angle ( $\Phi$ ) – 21° - 30°

Wind Region	Building Height – H (m)							
	H≤10		10<H≤15		15<H≤20			
	D.W & U.W	Central		D.W & U.W	Central		D.W & U.W	Central
A	889	1066		800	958		753	902
B	538	641		486	579		458	545
C	357	424		323	383		304	362
D	221	262		200	237		189	224
W	680	813		613	732		578	690

Roof Angle ( $\Phi$ ) – 31° - 60°

Wind Region	Building Height – H (m)							
	H≤10		10<H≤15		15<H≤20			
	Intermedi ate	Internal		Intermedi ate	Internal		Intermedi ate	Internal
A	1088	1554		978	1435		920	1369
B	654	1010		590	909		556	855
C	432	661		391	596		369	562
D	267	406		242	367		228	346
W	829	1262		747	1159		703	1089

D.W & U.W – Downwind and Upwind refer to note 6.

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**Flush Mount Interface Spacing Table for Tile Roof**

Type of Rail HOP-SLR03  
 Type of Interface #1 Tile Interface Bracket  
 Solar Panel Dimension 2m x 1m  
**Terrain category 3**

Roof Angle ( $\Phi$ ) - 5° - 10°

Wind Region	Building Height - H (m)									
	H ≤ 10				10 < H ≤ 15					
	D.W & U.W	Central			D.W & U.W	Central				
A	1617	1776			1381	1703			1222	1650
B	956	1358			822	1162			731	1031
C	626	880			541	757			482	674
D	385	536			333	463			298	413
W	1220	1649			1046	1491			929	1318

Roof Angle ( $\Phi$ ) - 11° - 20°

Wind Region	Building Height - H (m)									
	H ≤ 10				10 < H ≤ 15					
	D.W & U.W	Central			D.W & U.W	Central				
A	1232	1662			1057	1538			938	1359
B	737	1060			636	911			567	810
C	486	693			421	598			376	533
D	300	425			260	367			232	328
W	937	1357			806	1162			717	1030

D.W & U.W - Downwind and Upwind refer to note 6.

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Roof Angle ( $\Phi$ ) – 21° - 30°

Wind Region	Building Height - H (m)							
	H≤10		10<H≤15		15<H≤20			
	D.W & U.W	Central		D.W & U.W	Central		D.W & U.W	Central
A	1339	1617		1146	1381		1017	1222
B	798	956		688	822		613	731
C	525	626		454	541		405	482
D	324	385		280	333		251	298
W	1015	1220		872	1046		776	929

Roof Angle ( $\Phi$ ) – 31° - 60°

Wind Region	Building Height - H (m)							
	H≤10		10<H≤15		15<H≤20			
	Intermedi-ate	Internal		Intermedi-ate	Internal		Intermedi-ate	Internal
A	1513	1722		1348	1677		1229	1641
B	975	1432		838	1274		746	1157
C	639	986		551	848		492	754
D	392	599		339	517		303	461
W	1227	1641		1067	1533		947	1401

D.W & U.W – Downwind and Upwind refer to note 6.

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<b>General Notes</b>				
Note 1	Screws minimum embedment length into timber 35 mm			
Note 2	Recommended screws			
	<b>Metal Purlins/Battens</b>	<b>Fasteners to use</b>		
	0.55 mm – 1.5 mm	M6-11 TPI RoofZips		
	1.9 mm	M6-11 TPI RoofZips OR 14g-10 TPI Teks screws		
	2.4 mm and Above	14g-10 TPI Teks screws		
	<b>Wood purlins and Rafter</b>	<b>Fasteners to use</b>		
	Pine and Hardwood (35mm embedment and above)	M6-11 TPI RoofZips OR 14g-10 TPI		
Note 3	Above Spacing calculated based on 1.9mm steel purlin OR F17 Hardwood For Wind region C & D spacing for Tin Roof should be reduced as follows,			
	<b>Material</b>	<b>Wind Region C</b>		<b>Wind Region D</b>
		<b>Central</b>	<b>D.W &amp; U.W</b>	<b>Central</b>
				<b>D.W &amp; U.W</b>
	0.55 mm steel Batten	22%	25%	30%
	0.75 mm steel Batten	0%	0%	10%
				5%
Note 4	Following components are satisfied to use according to AS/NZS 1170.2-2011 Amdt 3-2013			
	<b>Components</b>	<b>Part Number</b>	<b>Description</b>	
	HOP-SLR03 Rail	HOP-SLR03	HOP-SLR03 Rail	
	#1 Tile Interface Bracket	#1	Tile Hook Type 1 with Test Report	
Note 5	<p>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.</p> <p>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.</p>			
Note 6	For the definition of Downwind, Upwind end and central, refer figure D9 from AS/NZS 1170.2-2011 Amdt 3-2013.			